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Volume 80 — New York, Saturday, October 14, 1922 — *Number* 16

The Work and Tools at Hand

WE IN the electrical industry have lived our short and active lives in an age of inspiration. We have dreamed great dreams. We have planned vast plans. We have organized. We have formed into groups and associations of groups. We have painted broad panoramas of alluring opportunities. We have proclaimed far-reaching purposes. We have thought much of the future. But all that we have really done has been the product of hard work and thinking.

Ambition clamors for big achievements. The meager proportions of one day's work fail to excite enthusiasm. Yet this is, after all, the unit out of which every great structure has been fabricated. It marks the steps by which all projects are attained, all visions realized. The world has been built with the tools that men have held in their hands at the time when each job was done. Progress has been evolved by doing little things, one at a time.

WE TURN now to an age of action. We have written our specifications for future development—embracing great superpower systems and universal electrification. We are facing to the front. But we stand here all of us, today, in the middle of the hot and dusty road, burdened with excess capacity and heavy overhead and in dire need of business. And all the talking, all the planning, all the organizing in the world will not get business and build the future except as we lay good bricks of daily work with the tools now here at hand.

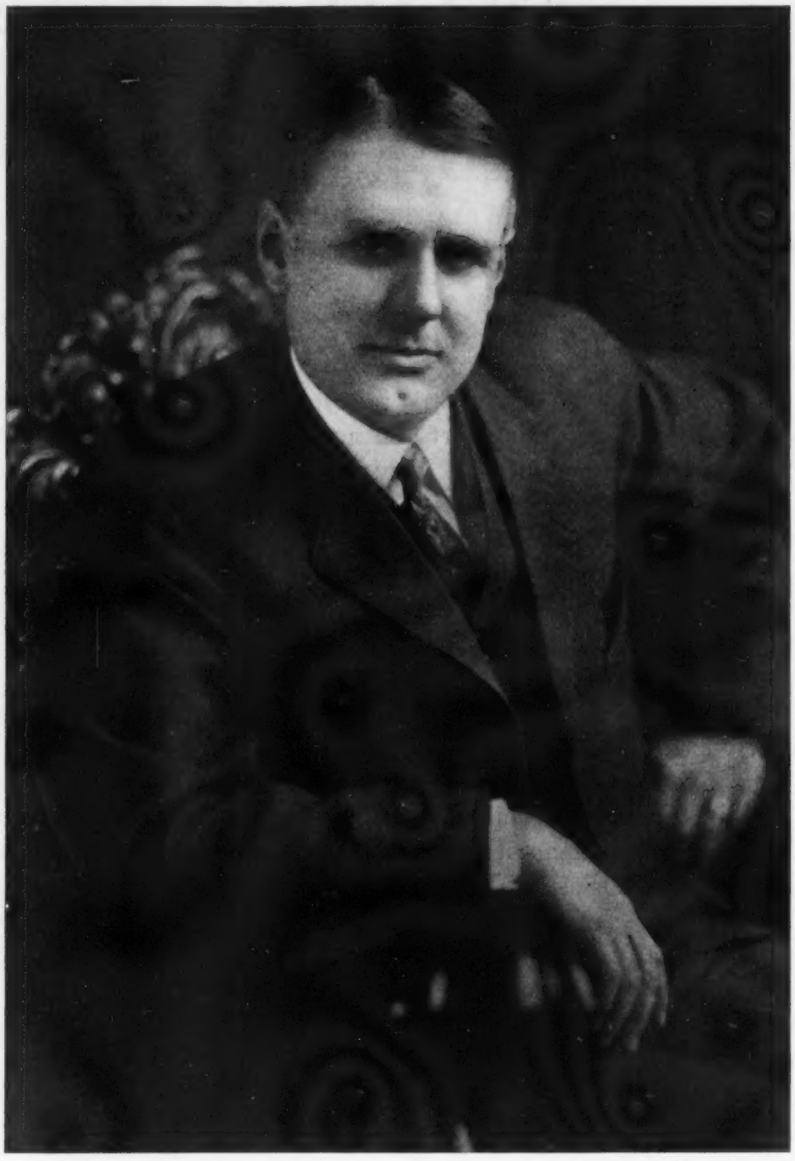
What shall we do? Why — electrical manufacturers, jobbers, central-station men, contractors and dealers live and work in towns and cities. In these communities are homes and stores and offices and factories. In every thousand of these homes today 280 are without electric flat irons, 888 need toasters and 947 percolators, 640 fans, 870 air heaters, 640 vacuum cleaners, 705 clothes washers, 988 ironing machines, 989 dishwashers, 952 sewing-machine motors, 984 ranges and 994 electric refrigerators must be sold before they are all equipped.

In these communities, too, 91 per cent of the grocery stores need better light and 70 per cent of the drug stores and so on. In fact, seven out of every ten stores in every town are underlighted and offer business to the electrical man. Moreover, the electrical equipment of offices, the motorization of industry, the use of electric heat for factory processes and of electric transportation is so underdeveloped that every man of us is literally hemmed in and overwhelmed by waiting market and prospective customers. Here we must make of daily work the bricks with which we will construct that glorious future which we talk about.

DAYS' work—that's what we need right now in the electrical industry—more full days of better work—following this natural course of least resistance, using the agencies now in the field, developing along our well-formed national lines of thought, but consistently applying all our power in individual and local effort. For bricks must be made of sweat and sand before they build the structure.

Howard Tuxbury Sands

Utility executive and master of public relations, whose wise counsel and inspiring example have won the high regard of the central-station industry.



THE rapid development of electric utilities along technical and commercial lines during the past quarter of a century has afforded remarkable opportunities for the advancement of industrious engineers and sales workers into posts of remunerative and well-established routine. The leaders of the central-station industry, however, have never been content to absorb themselves in purely local duties, but have struck out for themselves along lines promising progress through greater service to their employers and the art as a whole. Seventeen years ago a young man of unusual determination to apply his powers to their full was superintendent of the Lewiston & Auburn (Me.) Electric Company. The story goes that he questioned the wisdom of remaining longer on a property offering little apparent opportunity for advancement, but decided before leaving to put the dubious overhead system into apple-pie order. So well did Mr. Sands do this that chroniclers say it led to his selection to fill higher responsibilities elsewhere, until today Howard T. Sands of Boston, president or manager of half a dozen or more electric and gas companies under the control of Charles H. Tenney & Company, past-president of the New England Division and chairman of the Public Relations Section of the National Electric Light Association, stands in the front rank of utility executives noted for their thorough understanding of the problems of the industry and their ardent championship of friendship and the open door between public service corporations and the people.

It is hard to write in a restrained fashion about Mr. Sands' public relations ideas and practices. Ever since he became an executive he has been running utilities humanly. His frankness, patience, friendly interest in employees and capacity to make friends of people of different types and tempers are proverbial in the Tenney organization.

A prime mover in the establishment and maintenance of the New England Bureau of Public Service Information, Mr. Sands has rendered far-reaching service to the cause of better understanding between public and utilities in the Northeast. For years he has been speaking for "cards face up" in public relations and doing things that way himself. His knowledge of commission regulation is exceptional, and his interest in employee education is finding an outlet in comprehensive plans for the betterment of hundreds of men and women with vision to see the opportunities before the trained employee of the modern utility company. The intense loyalty of his subordinates, their respect for his judgment and their response to his leadership and stimulus are solid and sure.

Mr. Sands was born at Saco, Me., Sept. 12, 1867, and was graduated from the Saco High School in 1883. He entered the electrical field in 1896 as superintendent of construction for a hydro-electric plant at Mechanics Falls, Me., near Lewiston. His experience includes practically all branches of central-station service. From 1901 to 1905 he was superintendent of the Lewiston & Auburn company, from 1905 to 1909 manager of the Haverhill (Mass.) Electric Company, and since 1909 has been in Boston.

Mr. Sands is president of the Barre & Montpelier (Vt.) Traction & Power Company, the Haverhill Electric Company and the Montpelier & Barre Light & Power Company, general manager of the Malden (Mass.) Electric Company and the Suburban Gas & Electric Company of Revere, Mass., and an officer or director in other utilities. He is a man with a wide diversity of interests and has contributed much to the civic and social upbuilding of the communities in which he has been engaged.

Editorial Comment

Electrical World, October 14, 1922

Volume 80 Number 16

Plant Construction in Full Swing

REPORTS from all over the United States indicate that the electric light and power utilities have embarked on an immense program of new construction. From Chicago, Brooklyn, New York, Pittsburgh, California, Boston and other large centers news arrives of plans for new power stations and equipment involving expenditures of millions of dollars. These developments show that the load on existing stations is very large and that a future load is anticipated which must be carried by new apparatus. It fairly staggers the imagination to learn, for example, that an expenditure of $53,000,000 will care for the increase in the load at Chicago only until 1925. Then, again, the report of 62,500-kva. single-cylinder turbo-generator units for the new Brooklyn station shows the great progress that has been made in equipment development, for only last winter the manufacturers' engineers hesitated to make single-cylinder units larger than 45,000 kva.

The money market for utility financing has never been so favorable as now, and every incentive exists to utilize this situation. The wise policies of the leaders of the industry have guided the central-station companies past all the after-war pitfalls of bad financing and reactionary public sentiment, so that today the banks and the public look with confidence on the central-station industry and readily co-operate in plans for its development. Experience has proved its stability as an investment and its devotion to public service.

Keep Initiative in the Power Industry

AN EXTENDED analysis of the proposed water and power act to be passed upon by the voters in California on Nov. 7 was made in the *Electrical World* for Feb. 11 last. It is difficult to see how a thinking people can give it any support. In California the great utility properties are virtually owned by the public now. By the sale of stock to customers the utilities of the state have brought about public ownership as distinguished from political ownership. For example, the Pacific Gas & Electric Company has 23,000 stockholders, 80 per cent of whom live in California, and 35,000 bondholders, 50 per cent of whom live in California, making 58,000 persons whose money is in the securities of this company. The Southern California Edison Company has spread the stock ownership of that company among more than 48,000 individuals, by far the majority of whom live in the district served. There are, in fact, not fewer than 150,000 people interested in the four great power companies of California, either as stockholders or bondholders.

Private ownership in its technical sense exists, but, broadly speaking, what California possesses is public control and co-operation between the management selected by the technical legal owners and the government, with all the initiative which goes with private ownership still operative.

So far as hydro-electric development in California is concerned, private ownership assures the co-operative effort of federal and state controlling bodies, backed by an ever-broadening consumer ownership, all working together to bring out the highest economic use of water power. Such a broad-visioned control not only develops water power economically but preserves the individual initiative in our industrial life—an initiative that has meant so much in the establishment of America's present position among the nations of the world in all branches of industry as well as in the development of electrical industries.

Safe and Profitable Stocks for Customer Ownership

CAPITAL, as has been so often stated, is notoriously timid. It takes fright easily. Often it flees from its own shadow and is not readily induced to return. Such being the case, people or industries seeking capital should be most careful in dealing with it. Confidence and belief in the integrity of the individual or industry must be inspired first of all, and then the faith thus established must be buttressed by stability and constancy. Otherwise capital will not flow freely, to the detriment of industry, and in the electric light and power business abundant funds for expansion and development are our primary need. Hence the timeliness of the admonition regarding customer-ownership stock issues voiced by President M. S. Sloan of the Association of Edison Illuminating Companies at White Sulphur Springs this week.

It must be apparent that any public reaction caused by stocks which depreciated in value or failed to pay the accustomed return could not but be detrimental to the best interests of an electric utility. The very purpose for which the stock was issued would be defeated, and it would have been far better had the company not engaged in the business at all. The danger that confronts electric public utilities selling gilt-edged securities to customers is that others, seeing how readily the public absorbs these issues, may be tempted to try the experiment with securities of an inferior sort. A few examples of this kind have already come to light, and it will be most helpful if, as President Sloan suggests, the industry will police itself so as to preserve the market for its securities in the best condition. Until the idea of customer or public ownership is firmly established as a principle the industry cannot exercise too much care in scrutinizing what is offered to the public. A few slips would be calamitous to a cause so worthy, and, besides making it difficult to raise funds through customer-ownership campaigns, would also go a long way toward building up ill will rather than good will toward the local utility.

Dow Pleads for Simplicity in Rates

THE subject of rates is always controversial and is honeycombed with opinion and prejudice. We doubt whether it will ever reach a state of clarity or simplicity, because the element of business judgment and the diversity in central-station operating conditions enter into each case. On the other hand, a passive attitude under the plea that rates lie within the jurisdiction of regulatory commissions is not warranted. As Alex Dow says in the paper contributed by him to the convention of the Great Lakes Division of the N. E. L. A., which we print in this issue: "Regulation is not intended to substitute passive code for active business judgment."

Too largely, however, in the study of rate systems by cost analyses the attempt is made to apply rigidly the analysis to the customer in the form of a complicated rate system. Very often, indeed, the cost analysis has been made on the basis of arbitrary assumptions, yet the resultant rate is applied as though it represented a rigid and correct system. Cost analyses are warranted and desirable, however, to guide the business judgment of the rate maker and should underlie the rate systems used.

The attempt of Mr. Dow to reduce the number of rate forms to a minimum is in the right direction, and many leaders of the industry agree with him in his plea for more simplicity in the rates presented to the customer. Very recently there have occurred some attempts to make an accurate cost analysis and then to apply a rate system based on the results. Operating data founded on these efforts are awaited with interest. One effect of the present practice has been the development of new electric meters, and it may be that simplicity in rate application will be brought about by the further development of what might be called rate meters.

Electricity's Part in the "Better Home" Movement

BETTER homes are the objects sought through a campaign started this week in approximately 550 cities and towns of this country. This movement, which is rather social than commercial and which relies for its success on actual demonstrations of model homes, was organized by a woman for women. It aims at the education of women in household economies, and by the object lesson it presents it hopes to show, in addition, how the atmosphere of a home can be elevated and sweetened, household work made less irksome and the home surroundings made more comfortable and satisfying.

The work has been well organized and has been officially indorsed by President Harding, Secretary Hoover and a host of other national figures. This accounts for the rapid spread of the idea, which, fortunately, also commends itself. Thanks to the cooperation of the electrical industry, the model homes shown in the five hundred odd towns and cities are completely equipped electrically. The success of the initial movement has been such as to warrant the perpetuation of the idea, which eventually should permeate to every village and hamlet in the country. The home is the bulwark of American civilization, and anything which fosters home life is worthy of encouragement. Naturally the electrical industry, which can contribute so much toward rendering the home more comfortable and lessening the drudgery of housework, will want to become more closely identified with the movement. It is in line with the idea of the "home electric," but the approach is from a different angle and the fact that it is sponsored by women with no commercial object to serve makes it broader and more national in scope. The industry can well afford to do all within its power to make the plan an unqualified success.

Investigation of the Conditions in Residence Lighting

TWO papers on the conditions governing residence lighting were brought out by the convention of the Illuminating Engineering Society, both of them based on a careful survey of residence lighting as it is. The studies were intended to cover all types of residences, although in the average they dealt, as any statistical investigation must necessarily deal, mostly with middle-class living conditions. The total number of living quarters considered reached several thousand, and the averages obtained were, on the whole, probably as representative as could be wished. From this study several interesting features of practice emerged which perhaps were hardly looked for.

In one of the investigations the rather surprising fact was elicited that in the average house considered the artificial lighting was almost or quite as good as the natural, the fact being that in small houses, particularly in crowded city quarters, the window space is small, so that the distribution of light is bad, and in many instances the interior finish is such as greatly to reduce the effect of natural daylight even a few feet inside the windows. Dark decorations in fact proved to be one of the bad features in ordinary domestic illumination. On the whole, the values for artificial lighting were adequate if properly utilized, and where the lighting was bad the cause was unskillful dealing with the facilities at hand.

The usefulness of fixtures installed by the average speculative builder, or even by the casual owner of a house, depends very largely on two factors—how much is left of the building appropriation after everything else has been taken care of and what the fashion of the moment in decoration may be. For instance, at the present time, as has happened periodically in the past, most decorators seem to think it necessary to inflict on their clients conventional and expensive wall brackets which for illuminating purposes might just as well be non-existent, particularly when the room finish is dull, as it sometimes is in the very rooms that need the most light, to wit, libraries.

It was found, as was to be expected, that on the whole people who owned their own homes went to more trouble and expense in insuring proper lighting equipment than did those who were merely renting. But even the better class of owned houses showed a good many failings in the matter of equipment and particularly as regards convenience outlets. These ought to be rather numerous to avoid too much stringing of lamp cords. Such outlets are valuable not only for electrical appliances of various sorts, but for the portable lamps which in many rooms furnish the best available means for suitable illumination. The average provision for watts output per socket was in general found satisfactory. The total wattage, however, falls short on account of the in-

adequate number of outlets generally found, so that, roughly speaking, it is not much more than half what would be desirable for a well-lighted house properly equipped with conveniences. The main reason for the lack of an adequate number of outlets is the extremely high cost of wiring brought about not only by the cost of material and labor but by restrictions which add to it a large unnecessary factor. Much of this needless expense is due to underwriters' requirements which ought to have been thrown overboard long ago.

In addition, some trouble is undoubtedly due to lack of wisdom on the part of electrical contractors and workers who do not realize yet that cheap and effective methods of wiring in the long run mean an increase of use which will bring prosperity to the very men who now stand in the way.

The whole survey shows clearly the need of a general overhauling of wiring methods and material with a view to finding out what our neighbors across the Atlantic have long known, how to carry out house wiring in the interest of the man who has to pay for it and use it.

Energy Costs Are a Small Portion of Total Service Costs

IN THE discussion of rate matters and the cost of electric service the general tendency seems to be toward giving too much weight to the plant-production costs of energy in the steam plant and too little to the other items that go to make up the total cost of service. In figures covering a careful investigation of service costs recently submitted to a central-station executive it was shown that the energy costs for consumers in the residential class were much less than half the total costs of service. In energy costs the only figures included were those involved in the production of energy in the plant up to and including the switchboard.

In the absence of a clear-cut analysis of a given situation in this respect there have been many cases where embarrassment has been caused. A typical instance is one in which authorities forced a central-station company to accept temporarily a contract to supply energy to a railway at production cost plus 10 per cent, on the theory that it was bulk business and the 10 per cent was a fair contractor's profit. More than a million dollars' worth of equipment used outside the power plant to give the service was ignored entirely.

Kilowatts and kilowatt-hours are units of measurement that have been badly misused in the development of the industry of selling electric service. There is a tendency to talk about the unit as if a definite value could be assigned to it and as though it were not in the same class as the ton, pound, yard, mile or any other unit used in the measurement of physical quantities. This has produced a tendency on the part of the consumer to think of the unit in terms of its pure production cost, which is the smallest cost in the service for all but the larger commercial consumers with fairly high load factors. Some classes of service, notably the residence consumer, have an energy cost that is so small a portion of their total cost that even if the entire plant-production cost were to be dropped, 70 to 80 per cent of the service bills would still remain. In rural service the proportion remaining would be even greater. Many commercial consumers of the smaller kind have energy costs that are 50 per cent or less of the bills which they pay.

Gilchrist Raises the Issue, Should Appliance Selling Pay?

SHOULD the central-station company make money or lose money on appliance selling? To put it bluntly, this is the question which has been raised by John F. Gilchrist in his paper on merchandising policies presented at French Lick and published on another page. It is doubtful whether any message on a commercial subject ever delivered before a body of central-station men has excited more attention or been more widely discussed. In a word, he charges that most companies are selling at a loss and do not know it.

Mr. Gilchrist's company sells more merchandise than any other central station; therefore his frank admission that it has been consistently losing money on one of the most active and supposedly profitable appliances is impressive. It would indicate that other lines are also unprofitable. He has made an investigation of the retail appliance business done by nine or ten of the largest companies only to find that there is not one of the group that is making any money. Yet residence appliance load has grown to be about as great as residence lighting, and the sales of electrical appliances in a community may well equal the total sales of electricity. It is no longer a side line. It is a large and rapidly expanding business, and, as he says, losses can no longer be ignored. The necessity for profit has become imperative.

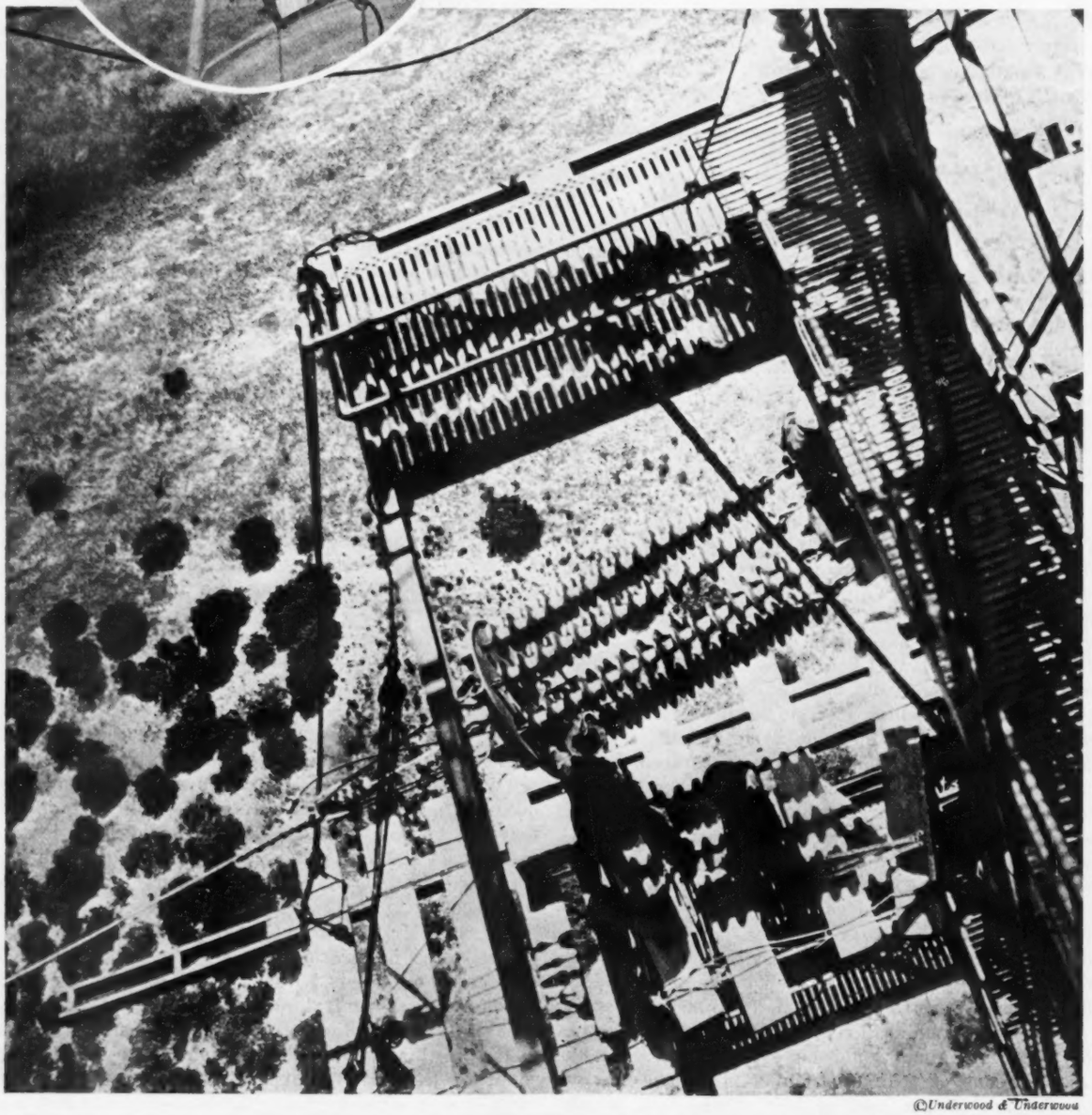
Mr. Gilchrist's argument divides itself into two parts. First, he appeals to utility men to stop fooling themselves, to learn their costs and to cease selling goods at prices that are not profitable. He urges this both for the good of the central-station company itself and for the protection and promotion of the appliance dealer who must be developed in every town if the market is to be adequately served. With this there can be no contention. In his analysis of the cost of selling washing machines in Chicago, however, he draws conclusions as to what should be done to put profit in a losing line and advocates that prices should be raised to make the selling pay, his experience being that sales were not decreased thereby. We doubt whether manufacturers and jobbers of washing machines will agree that solution lies all in this direction, or the public consent that the central station should plug the leak entirely at its customers' expense.

There are several ways to increase profit on retail sales. One is to raise prices. Another equally effective way is to increase turnover and improve efficiencies so that the invested capital earns more income and the selling actually costs less. And the fact that the ponderous organization of a great central station may sell washing machines at $192.20 and still lose money does not prove that some one else—utility or dealer—may not be able to sell them for considerably less and make a satisfactory profit because of smaller overhead, more skillful merchandising methods or some other influence.

All this Mr. Gilchrist has very much in mind, of course. His illustration is a picture only of the Chicago company's costs. But the fact remains that many of our largest central stations, the most active and experienced in appliance selling, are consistently losing money on this business and do not realize it. It is this condition that Mr. Gilchrist strikes at, and he is right 100 per cent when he says, "Know your costs and make your merchandising pay."

Repairing 60,000-Volt Crossing at Carquinez Strait

RECENTLY when a sailing vessel passed beneath the 60,000-volt span of the Pacific Gas & Electric Company across Carquinez Strait it drew such an arc that one of the conductors had to be replaced. The linemen may be seen completing the attachment of the new cable to the insulators at the Crockett (Cal.) terminal of the crossing. Work was facilitated by the use of the cable car (shown in the oval insert), which accommodates the tools and one man and is suspended from wooden wheels that run on the power cables.



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Snake River as a Source of Power

Undeveloped Power Sites Total 1,510,000 Hp., with Existing Flow Available for 90 per Cent of the Time—New Markets Must Be Created Before the River Will Be Developed

By W. G. HOYT
Hydraulic Engineer United States Geological Survey

IT HAS long been known that the lower portion of the Snake River constitutes a source of large potential water powers. But, although engineers of the Oregon-Washington Railway & Navigation Company ran a line through the canyon of the river in 1911, no complete maps had been made until the summer of 1920, when topographic engineers of the United States Geological Survey made a map of the area between Huntington, Ore., and Lewiston, Idaho, for the purpose of determining the power resources of this region and the possible interference between the development of power and the construction of a railroad. The writer accompanied the surveying party as hydraulic engineer.

The Grand Canyon of the Colorado at El Tovar and the Royal Gorge of the Arkansas are easily accessible and are therefore well known, but the canyon of the lower Snake, which is more than 1,000 ft. deeper than the gorge of the Colorado between Yavapai Point and Buddha Temple, and considerably narrower, will remain unseen to most travelers until an automobile road is constructed along the narrow ridges parallel to its course. The river is paralleled for the first 50 miles of the stretch by a branch line of the Oregon Short Line Railroad, which extends from Huntington, Ore., to the mining town of Homestead. A short distance below Homestead the river enters what is known as Hell's Canyon. In the canyon the average fall of the river is about 12 ft. to the mile, the low-water flow is about 8,000 sec.-ft. and the river is at some places barely 100 ft. wide. There are numerous rapids where the stream surges over huge rocks, and navigation on the upper reaches is practically impossible. High-powered gasoline launches make trips upstream from Lewiston for a distance that depends upon the stage of the water.

The river has certain general features which would make it a possible source of large blocks of power. Its flow is well sustained, its gradient is steep, its cross-section is comparatively narrow, and the geologic formations in the canyon would make good foundations for a dam of any height. On the other hand, construction and maintenance would be difficult and probably expensive, for the quarters during construction would be cramped, material would have to be brought from long distances, and the river is subject to enormous floods.

The rocks that make up the greater part of the canyon walls consist of several kinds of metamorphic rock—greenstone, schist, slate and argillite—with a comparatively small amount of limestone and of diabase, porphyry and other dike rocks. Most weathered surfaces of these rocks are extremely rough, for they show multitudes of open fractures. The weathered beds, however, are generally very thin, and the unweathered masses are regarded as watertight and as affording firm supports for dams of any height. Exceptions are seen in zones of rock which was broken by shear planes or faults during the later period of mountain building and which may be the cause of leaks or rock slides. The precise location of these zones can be determined only by detailed field examination. Basalt now forms the river channel only in areas that are low or depressed in contrast with the areas of uplift. The basalt may contain porous layers or partings that would allow water to escape from a dam, but such layers can be avoided by examination. Only moderate depths of

UNDEVELOPED POWER SITES ON SNAKE RIVER BETWEEN HUNTINGTON, ORE., AND LEWISTON, IDAHO

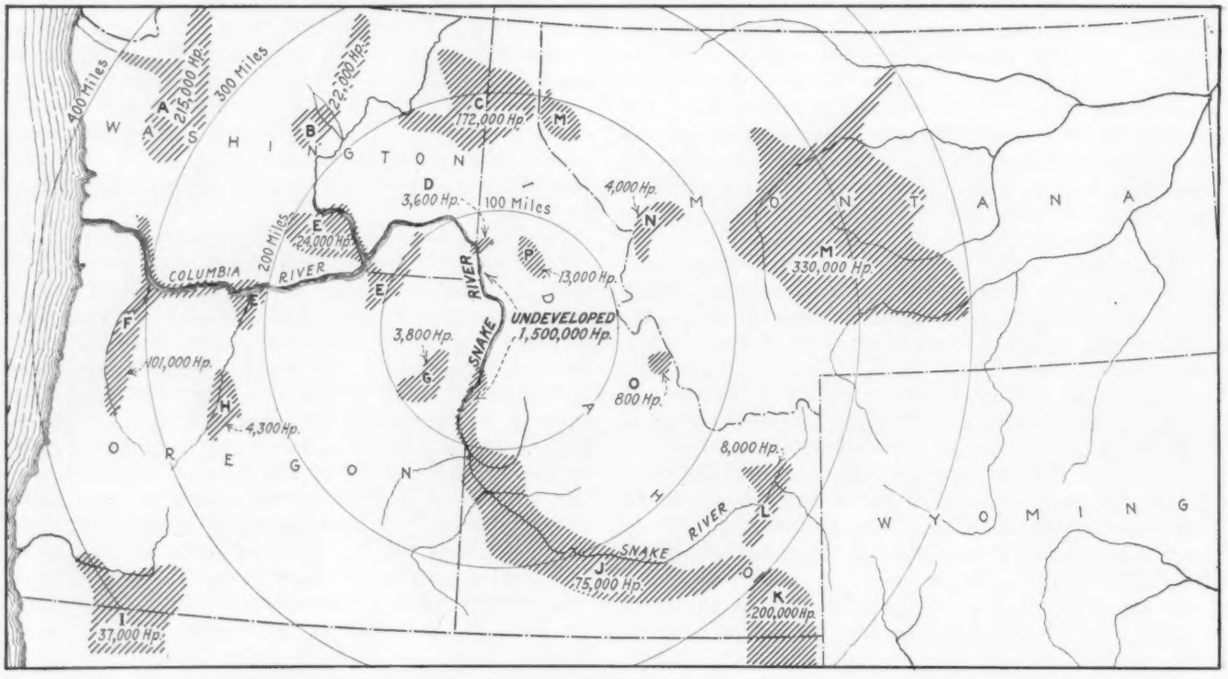
(Estimates of power based on static head and over-all plant efficiency of 70 per cent)

Location	Miles Upstream From Lewiston	Maximum Head		With Existing Flow				With Regulated Flow			
				Discharge		Horsepower		Discharge		Horsepower	
		Q90*	Q50*	Q90	Q50	.08HQ90	.08HQ50	Q90	Q50	.08HQ90	.08HQ50
Mile 154-188	.....	90	70	8,000	16,500	57,600	92,500	6,900	11,200	43,700	62,800
Site 12HK No. 1	145.3	25	20	8,000	16,500	16,000	26,400	6,900	11,200	13,800	17,900
No. 2	143.3	25	20	8,000	16,500	16,000	26,400	6,900	11,200	13,800	17,900
No. 3	135.7	30	25	8,000	16,500	19,200	33,000	6,900	11,200	16,500	22,400
No. 4	123.2	50	45	8,000	16,500	32,000	59,400	6,900	11,200	27,600	40,300
No. 5	120.8	65	60	8,000	16,500	41,600	79,200	6,900	11,200	35,900	53,800
No. 6	118.7	75	70	8,000	16,500	48,000	92,400	6,900	11,200	41,400	62,700
No. 7	112.2	150	140	8,000	16,500	96,000	185,000	6,900	11,200	83,000	125,000
No. 8	101.0	280	270	8,000	16,500	179,000	356,000	6,900	11,200	154,000	242,000
No. 9	97.2	275	265	8,000	16,500	176,000	350,000	6,900	11,200	152,000	237,000
No. 10	95.7	350	340	8,000	16,500	224,000	450,000	6,900	11,200	193,000	305,000
No. 11	83.5	475	460	8,000	16,500	304,000	608,000	6,900	11,200	262,000	412,000
No. 12	77.4	540	530	8,000	16,500	345,000	700,000	6,900	11,200	298,000	475,000
No. 13	52.7	190	180	8,000	16,500	122,000	238,000	6,900	11,200	105,000	161,000
Site 12HN No. 1	50.7	220	210	8,000	16,500	140,000	277,000	6,900	11,200	121,000	187,000
No. 2	41.5	260	250	15,000	21,500	312,000	430,000	12,200	16,300	254,000	326,000
Salmon-Snake Tunnel Site	77.4	530	530	3,800	5,100	161,000	216,000	3,800	5,100	161,000	216,000
Total	.....	...	...	.....	.....	919,000	1,510,000	.....	.....	800,000	1,130,000

NOTE:—Total includes only those sites which will utilize full fall of river, namely, Mile 154-188, No. 1, half No. 2, Nos. 3, 12 and 15 and Salmon-Snake tunnel site. *Q90=flow available 90 per cent of time; Q50 = flow available 50 per cent of time.

gravel and loose rock or boulders may be expected between the water surface and the bedrock in the stretch between Homestead and the mouth of the Grande Ronde River. Above and below that stretch the bedrock is probably overlain with considerable alluvium. The alluvium is probably thickest at rapids, which have almost invariably been formed by débris washed in by tributary streams. Bedrock was seen at only one place in the canyon, and even at that place what was thought to be bedrock may be only a pile of large boulders in the channel. In general, however, the geologic conditions are favorable to the construction of dams.

The low-water flow of the Snake, owing to an unusual condition existing on the plains of southern Idaho, is very well sustained. At times during the irrigation season the entire flow of the river is diverted at Milner and above for irrigation, but in the 50-mile stretch below Milner, however, there is a group of famous springs, which, with the return water from the irrigated tracts along the river, discharge continuously more than 5,000 sec.-ft. This flow will be maintained regardless of future irrigation diversions and in fact will undoubtedly increase. The flow that is available below Weiser but above the mouth of Salmon River is estimated at 8,000 sec.-ft. for 90 per cent of the time. Fortunately for the development of power, the low-water flow of Salmon River, the largest tributary to the Snake, occurs during the winter, so that the flow available for 90 per cent of the time below the Salmon is large. It is estimated as 15,000 sec.-ft. The flow available for 50 per cent of the time above the mouth of the Salmon is 16,500 sec.-ft., and that below the Salmon 21,500 sec.-ft. The flow now available for half the time will be materially reduced by the construction of the proposed reservoir of 3,000,000 acre-feet at American Falls for use in irrigation. It is estimated that after its construction and the accompanying diversions the 50 per cent flow will be reduced to 11,000 sec.-ft. above the Salmon and 16,000 sec.-ft. below.



TERRITORIES NOW BEING SERVED BY THE LARGER PUBLIC UTILITIES OF THE NORTHWEST, AND TOTAL TURBINE CAPACITES AT GENERATING PLANTS

A Olympia Light & Po. Co.
Northwestern Po. & Mfg. Co.
City of Tacoma
City of Seattle
Puget Sound Po. & Lt. Co.
B Okanogan Valley Po. Co.
Chelan Elec. Co.
Wash. Coast Utilities Co.
Great No. Ry. Co.
C Wash. Water Po. Co.
Spokane & East. Ry. & Po. Co.
D Wash.-Idaho Wa. Lt. & Po. Co.
E Pacific Po. & Lt. Co.
Black Rock Po. & Irrig. Co.
F Northwestern Elec. Co.
Pac. Ry. Lt. & Po. Co.
Eugene Elec. Co.
Mountain States Po. Co.
G Eastern Oreg. Lt. & Po. Co.
H Deschutes Po. Co.
Bend Water Lt. & Po. Co.
I Calif.-Oreg. Po. Co.
J Idaho Power Co.
K Utah Po. & Lt. Co.
L Ashton & St. Anthony Co.
City of Idaho Falls
Utah Po. & Lt. Co.
M Montana Po. Co.
N Missoula Lt. & Po. Co.
O Salmon River Po. & Lt. Co.
P Grangeville Elect. Lt. & Po. Co.

Flood Control a Big Engineering Problem

The magnitude of the floods that may occur in the Snake below Weiser will require very careful engineering, both during construction and in the design of the structure. The proposed American Falls reservoir, although it will be one of the world's largest, will probably have little effect on the flood flow, for the majority of floods are likely to occur when the reservoir is full and, furthermore, a large part of the flood in the canyon may originate below the proposed site. A study of the floods on the Salmon and the Snake show that these may come at the same time, and consequently the flow of the Snake below the mouth of the Salmon has to be taken as the sum of the maximum flow on each river. Floods of 90,000 sec.-ft. may occur above the Salmon every ten years, and of 140,000 sec.-ft. every fifty years, and floods of 180,000 sec.-ft. may occur below the mouth of the Salmon every ten years and of 300,000 sec.-ft. every fifty years. The work of bypassing such floods during construction and of taking care of the water after the dam is constructed will require very careful engineering.

Detailed planetable surveys and other examinations were made at ten possible dam sites and on the divide between the Salmon and Snake Rivers in T. 26 N., Rs.

1 E. and 1 W., Boise Meridian, Idaho, where there is a possibility of diverting Salmon River at a point 73 miles above its mouth into Snake River under a head of 450 ft. The accompanying table shows the power possibilities of each site under different rates of flow.

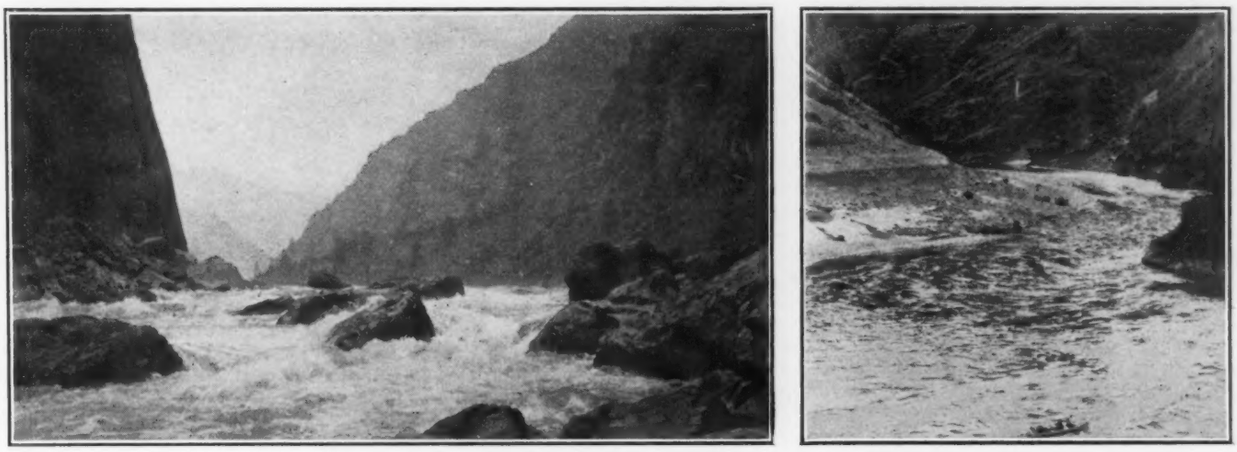
The probability of developing any new sites upstream from Homestead is remote. Unless the railroad is relocated, the height of dams must be less than 30 ft. The river is fairly wide, the side walls are generally basalt and are not especially desirable for abutments, and the bedrock is probably overlaid with considerable thickness of loose material. Below Homestead and above the mouth of Grande Ronde River sites can be obtained which will utilize the entire fall. Oppositely placed buttresses are rare, and as the depth of bedrock below the water surface is unknown the principal factors in locating dam sites were the character of the side walls and the width of the cross-sections. Many of the sites chosen are worthy of serious consideration, though closer examination will probably show that some of them are unfavorable.

In developing many of the sites it will be necessary to construct a railroad to transport materials. If the cost of constructing the railroad is put into the cost of development, the unit costs will be high. If, however, the railroad is constructed between Homestead and Lewiston at such a height that it will not interfere with the development of water power, construction work will be facilitated. Owing to the large expense in building foundations, high dams will probably be more feasible than low dams; but, on the other hand, if dams are built so high that floodwaters cannot pass over the crests, tunnels or other artificial spillways will have to be constructed at great cost. No sites were found at which it would be possible to construct large rock-filled dams at small expense and divert the floodwater through short tunnels across narrow necks. Even if such sites were found, the problem of making such dams watertight would be a difficult one, for comparatively little silt is carried in the water and there is almost no dirt on the river bottom or sides which could be moved. Estimates of the costs of construction at sites chosen were not made, and as the depth to bedrock is not known estimates of probable yardage are rather rough. At Coon Hollow, the lowest site on the river, it was estimated that if bedrock lay 70 ft. below the water surface, a concrete non-overflow dam to raise the water 270 ft. would contain about 1,000,000 cu.yd. The installation at this site would be about 450,000 hp., or only about 2 cu.yd. of material per horsepower.

The Pacific Power & Light Company has applied to the Federal Power Commission for a preliminary permit for ten sites on Snake River between Homestead and Lewiston. This company now operates in southern Washington and northern Oregon, the greater part of its territory lying within 200 miles of the sites applied for. The accompanying map shows approximately the limits of the territories now being served by the larger public utility companies of the Northwest and their installed wheel capacities. The centers of all the large present markets except that of the Utah Power & Light Company lie within 350 miles of the power section of the lower Snake, and because of its position the Snake undoubtedly constitutes a very valuable power resource of the Northwest. How soon we may expect its development cannot be predicted.

The industrial development of the Northwest during the next few decades will no doubt be enormously increased. To keep pace with the increased demands for power additional power sites will have to be developed, and the sites at which power can be developed and delivered to the market most cheaply will naturally be developed first. Sites on the Columbia and Deschutes Rivers, however, are capable of developing well over 1,000,000 hp. These sites lie nearer the present markets of the coast than those on the Snake. In British Columbia there is a large amount of undeveloped power on Clark Fork in its short course in Canada and on the Kootenai between Kootenai Lake and Columbia River, which are nearer the Spokane market than the sites on the Snake.

On the Flathead River there is sufficient undeveloped power to take care of a demand twice as large as that now supplied by the Montana Power Company. On the upper Snake, in the center of the power market supplied by the Idaho Power Company, there are possibilities of developing 250,000 hp. All sites mentioned are nearer present markets than those on the lower section of the Snake River between Weiser and Lewiston, and, other things being equal, they will probably be developed first. If, however, in spite of their greater distance from the present markets, a new market should be made, or it is found that power can be developed and delivered cheaper from the sites on the Snake than from the other sites, their early development will naturally follow.



IN THE CANYON SNAKE RIVER HAS A FALL OF 12 FT. TO THE MILE

The International Status of Superpower Systems

Use of High-Voltage Cables and Trend of Practice and Regulation Are Discussed by Technical Congress

A WIDE divergence of opinion and practice respecting high-voltage cables, generators, construction methods, laws and protection was brought out at the international conference on high-tension transmission held in Paris several months ago. The transactions of this body have been recently made available through M. Jean Tribot-Laspiére, general secretary of the conference; H. M. Hobart and C. O. Mailloux. The work of the congress was divided into four divisions:

1. Laws affecting superpower systems and transmission lines in the various countries.
2. Generator and transformer limitations, protection and operation.
3. Construction and installation of lines.
4. Operations and practices of the various systems.

One result of the discussion was the passage of a resolution declaring it to be desirable:

First—That the existing differences between the regulations in force in different countries in regard to crossing public highways (roads, railways, streams, telegraph or telephone and signal lines, etc.) should be reduced as far as possible.

Second—That, as far as possible, the crossings should be established along the right-of-way entailing the least mechanical stress in the line and its supports and that, instead of fixing in the rules the minimum angle of crossing, the maximum length of crossing allowable should be fixed, which maximum length should, moreover, be allowed to vary according to the nature of the highway to be crossed.

Third—That the protection provided against accidental fall of the line should be secured either by doubling the number of insulators at the supporting towers at the crossing or else by any suitable equivalent arrangement, but in any case without the use of guard wires, protecting nets or like arrangements.

Fourth—That the factors of safety to be used in the calculation of supports made of wood, steel or armored concrete, and of their foundation, should be standardized, taking as the basis the lowest values of safety factor considered adequate for insuring safety according to the experiences had in various countries.

The general tendency in the construction of alternating-current generators, it was reported, is to increase the magnetic leakage in order to secure safety. Voltage drops of 25 to 45 per cent for steam turbo-generators of 625 kva. to 43,700 kva. were found to be admissible and 21 to 29 per cent for low-speed alternators of 800 kva. to 7,000 kva. M. Boucherot voiced the opinion of the congress that designers of water turbines should simplify their methods of speed regulation and investigate the feasibility of providing a damping mechanism in connection with water admission to prevent oscillations.

HIGH-TENSION CABLES

One of the most interesting features of the congress was the discussion of cables. France uses three-conductor cables at 50,000 volts and single-conductor cables up to 70,000 volts. Tests are now going on which indicate that 120,000-volt single-conductor cables will soon be on the market. The maximum cross-sections of French cables are 100,000 circ.mil for three-conductor and 750,000 circ.mil for single-conductor. The current density allowed in the large cables is from 0.75 amp. to 1.25 amp. per 1,000 circ.mil, according to the cross-section, with an allowable maximum temperature of 50 deg. C. At 50 cycles, with 35,000 volts between conductor and lead covering, the dielectric losses are about 0.8 kw. per mile at 25 deg. C. and 1.5 kw. per mile at 45 deg. C. A 50,000-volt, three-phase, 50-cycle cable has connected Denmark and Sweden since 1913 and has never given trouble. In Italy three-phase cables are used at 30,000 volts and single-conductor cables up to 80,000 volts. In England the upper voltage limit is about 33,000, but English cable manufacturers expect to put on the market in the near future 66,000-volt and 70,000-volt three-phase cables. Holland uses cables up to 50,000 volts, and Switzerland has a 150-mile (240-kg.) line made of 30,000-volt single-conductor cable.

Concrete poles are used extensively in Alsace, Norway and Sweden. The Alsace line is 70,000 volts with 650-ft. to 725-ft. (200-m. to 220-m.) spans.

QUESTION USE OF REACTORS

The use of reactors for limiting short-circuit troubles was questioned and the opinion expressed that this practice should be limited to the protection of transformers. A general opinion was also expressed that outdoor substations are economical on lines exceeding 100,000 volts.

The use of synchronous motors or condensers for securing better line regulation was advocated. M. Blondel introduced a unique idea for securing good regulation. He suggested using a synchronous-motor-series-generator set with rotors displaced and field regulation whereby the reactive kilovolt-amperes taken from the line by the synchronous motor would be corrected for phase angle and put back into the line by the series generator.

M. Boucherot suggested a constant-impedance transmission system whereby no power-factor variation would occur and whereby voltage and current would automatically change with the load.

The whole realm of transmission was discussed by the delegates, and each country presented its views and methods of construction. The factors of safety and the sizes and types of towers proved different in the several countries. The differences could largely be accounted for by reason of a variation in density of population or a variation in legal restrictions. Since many contemplated lines are international in extent, standardization in legal requirements should exist. France and Switzerland have such an agreement for supervoltage lines. The delegates felt that uniformity in practice coupled with simplicity in installation was a primary essential.

Three reports on protection created spirited discussion. The value attached to various apparatus or particular arrangements is generally not based on observations made under conditions which could be compared. Most of the delegates declared themselves in favor of discarding any old-fashioned protective apparatus, especially horn-gap lightning arresters or protective equipment connected to the line in series with such arresters. On the other hand, the usefulness of the aërial ground wire against traveling waves or disturbances was almost unanimously recognized. For medium voltages the delegates favored the ungrounded neutral, but for high-voltage lines the grounded-neutral system was favored.

Rate Forms Should Be Minimized*

Two Principal Methods of Charging Necessary and Desirable Variations Are Few—Careful Cost-Analysis Studies Should Be Used as a Guide to Business Judgment in Formulating Tariffs

By ALEX DOW
President Detroit Edison Company

THIS is a talk about some phases of the art of rate making. It will not be long, and it presumes, with reason, that this audience knows so much of the technique of cost analysis and of the law of rate making that preliminary discussion of these phases is superfluous. The law is not voluminous, but the diversified interpretations and the local applications thereof are the makings of many books—so many that the comparatively few and simple commandments laid upon us are at times obscured, rather than displayed, by the commentaries. Moreover, our statistical associates, having analyzed and allocated our costs to the third place of decimals, having assigned values to each component of costs, and after infinite permutations and combinations, having looked upon their finished and balanced work and seen that it is good, have (some of them) told us that thus and not otherwise shall rates be made—thereby reducing rate making to a mathematical formula whose rigid factors are the costs of prior periods.

U_ILITIES ARE LEGALLY TRADERS

We are traders in the eye of the law—not administrators of a trust. We are expected to use our trained judgment to anticipate social and commercial movements, so that we may be ready for our part therein, and our earnings will suffer if our judgment is amiss. True, we are under regulation—too much in a few cases, possibly too little in others—but regulation is not intended to substitute passive code for active judgment. On the contrary, it serves to protect us from those conditions of competition and of personal or political pressure which in the past tended to make us do, not the thing that our best judgment dictated, but what the stress of the moment compelled.

You see now that I am not talking in favor of any hard and fast formula for rates or set rule for rate making. My talk will be directed toward showing that there is much room for the exercise of good business judgment as to the resultant rate, the actual dollars and cents, which we should endeavor to obtain from any stated class of service; that simple and standard forms of rates will meet each practical requirement, and that the adherence by each company to the least number of rate forms is to the interest of all companies.

Any rate quoted for electric service is presumed to meet two commercial requirements. First, it is to provide the costs of the service to be rendered, together with a suitable proportion of the total return to be earned on the company's investment. Second, it is meant to be consistent, in its ordinary operation, with the other rates constituting the company's complete schedule. If it fails to meet the first requirement, then the burden of costs and of return loaded on the other scheduled rates will be more or less than is reasonable. If it seems to be inconsistent with the other rates, there will be criticism and complaint either from the class of customers to whom the rate applies directly or from the other classes who will imagine that the rate works a preference to a favored class.

Now, if all of a company's rates were of the same form—for instance, if all rates are straight-line meter rates per kilowatt-hour—there would be a fictitious simplicity of schedule which would forestall the frequent faultfinding of the uninformed to the effect that our schedules are too complicated for their comprehension and therefore are justly suspected of unfairness. I need not demonstrate here that such a schedule would sacrifice fairness and would be unworkable except in communities of the smallest size and of absolutely uniform composition. Differences in load factor make differences in cost that have forced recognition wherever are found the differing demands of residence service, commercial service, street lighting and industrial power.

Now, let us consider an extreme case of classification, such as one still occasionally finds, where the schedule has a multiplicity of rate forms, of rate classes and of optional or compulsory riders. Such a schedule undoubtedly represents an honest effort to apportion costs and a well-intended effort to collect a return from each class according to the value of the service to that class. But it requires an expert to pick just the right combination of rate and riders, and the ordinary business man throws up his hands and shouts for help when you try to explain to him the sweet reasonableness of each discount or credit or revision to which he is or is not entitled. He says it is worse than a federal tax blank—and that is saying a lot. What the professional critic or the opposing counsel in a rate case will say is left to your imagination—or, it may be, to your remembrance.

TWO FORMS OF RATES NECESSARY

In my opinion, only two principal rate forms are necessary for any company, and the variants thereof not necessary but desirable are almost as few. A straight kilowatt-hour rate, qualified by a well-considered minimum bill to eliminate the idle meter and by a very few "blocks" or quantity discounts, is desirable for some classes of service where the customers are many, the average bill is small and the diversity factor is great. A rate having a demand component is equally imperative where the average account is large, where the load factor of different customers varies materially, and especially where the investment required by any one customer or any one industry may become a measurably large part of the total investment of the company. A very simple demand rate, not requiring electrical

*Paper presented at the convention of the Great Lakes Geographic Division of the National Electric Light Association at French Lick Springs, Ind.

measurement of demand, works well in residence business, but is not imperative in that class.

Class rates have their proper place. Seasonal business, such as that of summer amusement parks, is excellently dealt with by a class rate. Business inherently off-peak is well dealt with by such a rate; but I distrust that expression, "off-peak"—it is too often misused. I would rather describe the intended class of service as "valley" business. A class rate may be made by a rider on a regular form and is better made in that way unless the class is very narrow and has permanent cost characteristics. I intentionally say nothing as to how demand is to be determined. There are plenty of choices. Some are better for one class of service and some for others. The simplest among them is usually the best. Neither do I specify the rate form. The Hopkinson form, fixed charge plus running charge, is the most generally applicable.

It is sometimes pleaded that a Hopkinson form of rate is not elastic; that the requirement that all fixed costs and charges shall be covered by the demand part of the rate serves to discourage desirable business which has seasonal slack periods during which the customer will feel the fixed monthly charge to be a burden or to be a payment for which value is not received. But, although the Hopkinson analysis rigidly places in the demand column all costs of being ready to serve and includes therein the return on capital, there is no compulsion to follow that rule in making the rate. Making the rate is not the function of the analysis. Its function is to guide your business judgment and prevent your fooling yourself. You may properly, and in many cases wisely, collect in the fixed part of the rate only those demand costs which are out-of-pocket or increment costs, and you may spread the return over the running or kilowatt-hour charge. What is important is that year by year you shall collect those costs and that return and shall know that they are collected.

Again, it is pleaded that the customer whose temporary or seasonal demand, lasting only a few months, interleaves with the temporary demands of other customers falling in other months should not be required to pay the full annual charge determined by the Hopkinson theory. Here once more is a misapplication of the analysis, permitting the analysis to make a rigid rate instead of being merely the guide to the business judgment of the rate maker. You can state this case technically by saying that the mutual diversity factor of the several customers to whom the rate applies is such that the collection of the full annual charge from each customer would give a needlessly high return to the company. The vital question in such a case is whether the diversity factor is a temporary or a permanent item in the equation. If the number of customers is large enough and the diversification of their different industries is great, the factor is probably permanent. In other words, the demand seasonally released by one customer will certainly be taken on forthwith by another. The diversity factor of all our several classes of service is the principal reason for the existence of the central station and is indispensable to us. But whether we release part of its advantage to any class of desirable business or whether we decline to do so is a matter for our business judgment, having regard not only to that one class but to the reaction on the business as a whole. If we decide that it is well to do so, all we need do is provide for revision of each customer's demand more frequently than once a year—say, at six months intervals or even monthly. It is not necessary, nor is it good policy, to make a lot of special contracts or special classes or to invent a cruel and unusual rate form, and it is seldom necessary to have a revision interval shorter than six months.

Following up this reasoning, it appears that if the customers are very numerous, if their permanent diversification is wide, and if there is no one preponderating customer nor one preponderating industrial group, then one Hopkinson rate, with the privilege of frequent revision of contract demand, may be made universal. Contrariwise, if one customer or industrial group preponderate, it will be necessary to require that customer or group to guarantee the full annual return on the investment which it requires the company to make, because there is no other certain market for such a large block of power. In the latter case two differing rates must be formulated, one for the preponderating customer or industry and the other for the generality of other industrial customers. But each rate should be of the Hopkinson form, and the Hopkinson analysis should guide the rate maker in writing the rate figures.

Cost Analysis Necessary

Let me say that I do not disparage cost analysis. On the contrary, I have analyzed costs by what we know as the Hopkinson method for more than thirty years, and I have by myself or by deputy analyzed annually the costs of one property year by year since 1896. It is absolutely necessary that costs should be analyzed, but our analysis should be only a study—a very thorough study—to guide our judgment. It would be a public misfortune to have the analysis automatically fix the rates.

I said that the law governing rate making is not voluminous. It is brief and sensible. It requires that each class of service shall carry its own costs so that it shall not be a burden on another class. It forbids undue preference or discrimination between customers, and it prohibits the establishment of a non-compensatory rate by a regulating authority. See the North Dakota lignite rate case. It does not forbid a company from making such a rate—say, for development purposes—provided the rate does not so operate as to burden other consumers or classes; but it squarely places on the company the responsibility for justifying such a rate when it shall be challenged. The law distinctly says that we are not bound to collect an identical return on each kilowatt-hour sold or on each dollar invested for differing services. After setting the lower limit of a rate at the figure which will prevent a burden being placed on one class for the benefit of another, it sets the upper rate limit as the value of the service.

I sum up this talk by pleading for thorough analysis as a guide to business judgment, while I deprecate the substitution of a rate theory or code for business judgment. I point out that the return upon our investment is a large component in our average rate and is not required to be an equal proportion of each rate. On the contrary, the law presumes that we will exercise our business judgment, placing the greater burden, within reason, on the service classes which can best afford to carry it. I have pointed out the wide limits within which we are to exercise our judgment. Finally, I plead for a minimum and a uniformity of rate forms and am positive that proper selection of values for each component of a demand type of rate will adjust it to any or all the conditions which must be taken into consideration by the rate maker.

Features of St. Louis Automatic Substation

Automatic Reclosing Outgoing Feeders—Motor-Operated Valve on Cooling System of Transformers and Regulators—Transformer Core Lifted on Steel Frame Extending Through Roof

By WALTER H. MILLAN

Superintendent of Substations, Union Electric Light & Power Company

THE new Kingsbury Boulevard automatic substation of the Union Electric Light & Power Company, St. Louis, embodies several interesting features of control and construction. Besides the regular protection afforded by directional and time relays, both the transformer and regulators are equipped with thermostatic controls which trip the transformer oil switches when the oil temperature rises above 85 deg. C. In order to maintain flexible control on the cooling-water system, motor-operated valves are used. The 4,500-volt distributing feeders are sure of continuous service since automatic timers reclose the breakers by means of single-phase wattmeter-type motors.

The automatic control equipment consists of protection of the "tap" feeder and both legs of the "loop" feeder by "IK-104" directional relays in combination with the "CO" wattmeter type relays having a definite time characteristic. The directional relays are connected to trip when short-circuit current flows out of the station only. Protection of the one 13,200-volt outgoing feeder, the three three-phase, 4,500-volt outgoing feeders and the 13,200-volt side of the transformer is provided by "CO" relays in each phase. The transformer is protected from overheating by T-313 thermal relays in each phase of the high-voltage winding. These relays are designed to have the same thermal characteristics as the transformer and are connected to trip the H-3 oil switch in the high side of the transformer when the temperature limit is reached.

THERMAL RELAYS USED

The transformer and each of the three regulators are protected from excessive oil temperature by a thermostat beneath the oil in each of the units. These thermostats are all connected in parallel with the tripping circuit of the T-313 thermal relays and an oil temperature of 85 deg. C. in any of the four units will cause the transformer oil switch to trip.

The cooling water of the transformer and regulators is turned on and off by means of motor-operated valves in the water line of each of the four units. By this means of cooling the capacity of this equipment is increased 33 per cent. These motor valves are each controlled by two thermostats placed beneath the oil, in the regulator and the transformer. The transformer cooling water is turned on at a temperature of 75 deg. C. and turned off at 65 deg. C., while the water for the regulator is turned on at 65 deg. C. and removed when the temperature drops to 45 deg. C.

The automatic regulation of voltage is accomplished in the usual way. As a single set of regulators is used, only bus regulation is obtained. However, the usual rising characteristic is given to this regulation by means of type H line-drop compensators. The three 4,500-volt outgoing feeders are not only short but are of nearly the same length, and no trouble has been encountered. For the purpose of working on any of the three regulators arrangements are made by which any or all three may be cut out completely without interrupting the service. The regulators were accurately checked to determine the exact zero position at which the secondary may be shorted out by means of a disconnecting switch and the loop cleared by opening two other "disconnects." The excitation of the primary is interrupted by a single-pole hand-operated oil switch

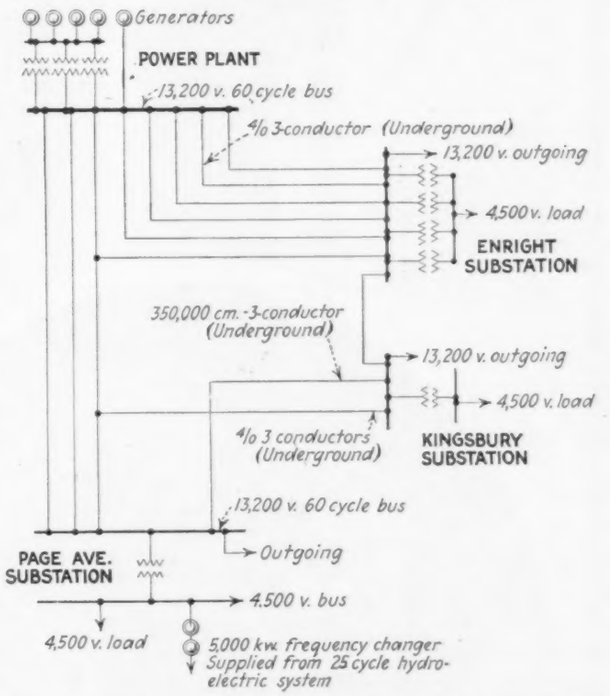
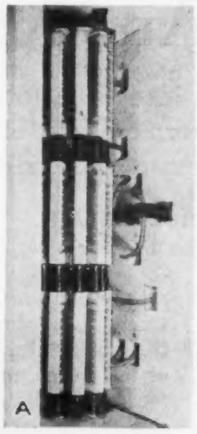


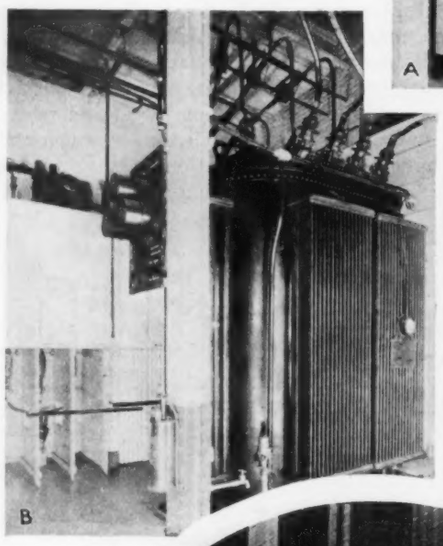
FIG. 1—DISTRIBUTION LAYOUT OF THE ENRIGHT, KINGSBURY AND PAGE AVENUE SUBSTATIONS

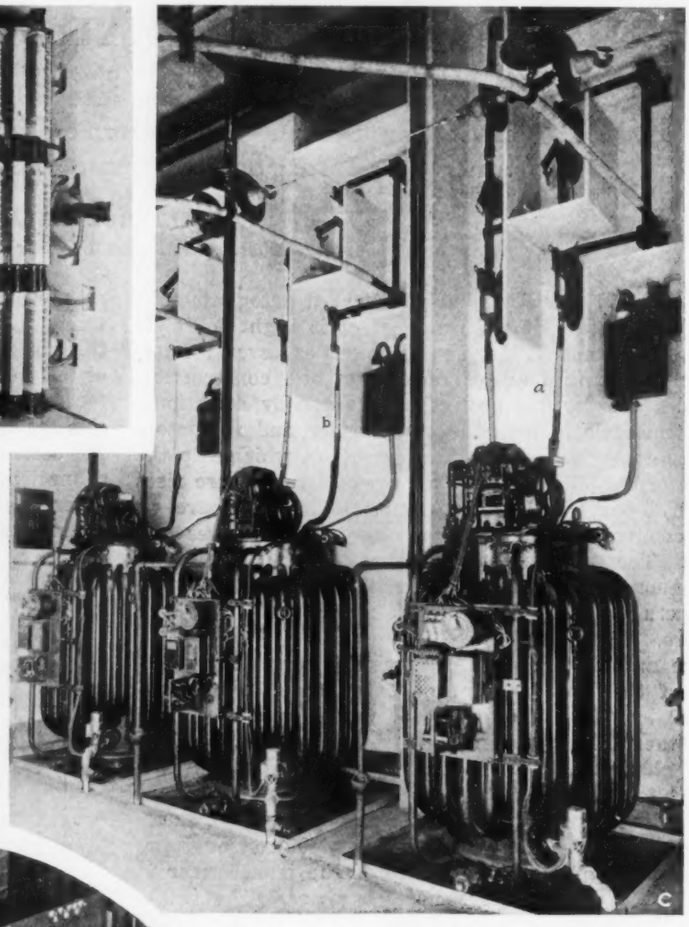
connected in the neutral leg of each regulator primary. After the exact zero position was determined a wattmeter dial train was mounted on the end of the shaft of the operating motor, the dials being set at zero. Obviously the inspector has only to turn the regulator by hand to the zero position on the dial train in order that a very close zero setting of the regulator may be obtained.

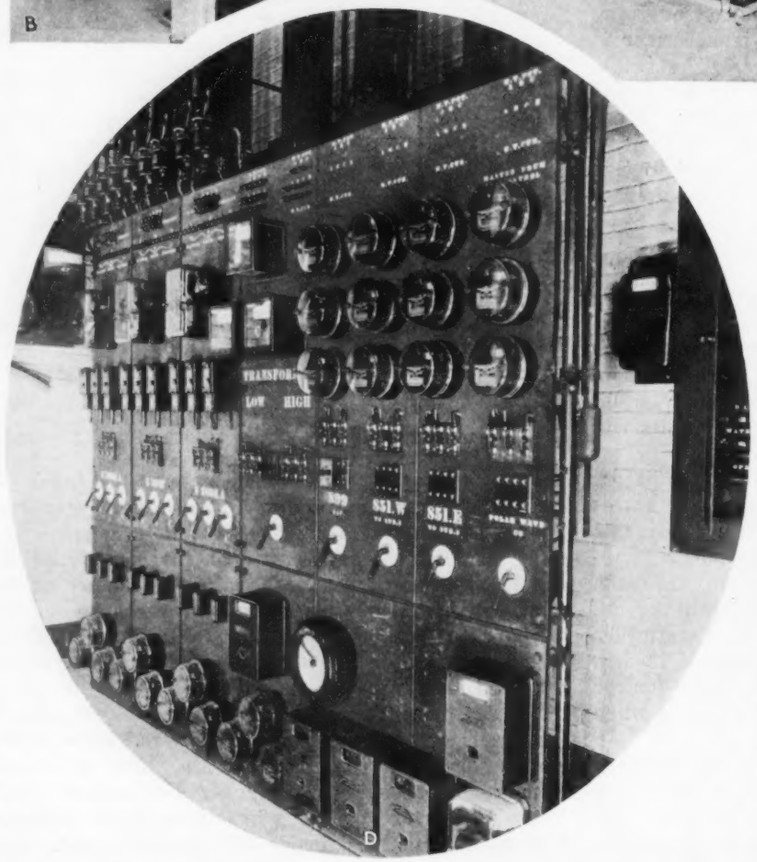
The automatic reclosing of the 4,500-volt outgoing feeders is obtained by standard timers. One of these timers serves for the control of the three single-phase circuits composing an outgoing three-phase feeder. These timers are operated by single-phase wattmeter-type motors installed inside of the timer cases. These motors are in circuit continuously, being held from moving by a mechanical stop which is removed whenever

Automatic Alternating-Current Feeder Substation









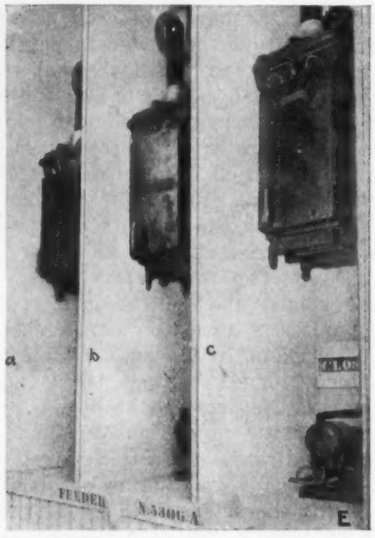
A—Stack of 13,200-volt feeder reactors.

B—Transformers have temperature control.

C—Water-cooled regulators.

D—Conveniently arranged control board.

E—Open-and-closed indicators on high-tension circuit breakers.



any of the three oil switches on that particular feeder drop out. The motor drives through reduction gears a set of three fingers. The entire apparatus somewhat resembles a drum controller. Once released, the motor drives the controller through one complete cycle of operation (one revolution of the drum) and is brought to a standstill by the mechanical stop.

SEQUENCE OF AUTOMATIC OPERATIONS

During the cycle of operation each of the traveling fingers in turn engages and operates a set of three quick-break contacts, each of which will operate the closing circuits of the oil switch on one of the three phases. These three contacts when engaged by one of the fingers do not close simultaneously, but are sufficiently lagged to prevent an excessive demand on the operating bus supply, should all three of the phases of the feeder be open at that instant. The traveling fingers are set at such points on the drum as to produce the following performance: The motor driving the drum is adjusted so that one revolution of the drum is made in two minutes. The finger producing the first reclosure is set to engage the contacts immediately after the dropping out of one of the switches. The three contacts are closed in six seconds, and any of the three phases that have opened will be reclosed. The drum continues to rotate, and the second reclosure takes place twenty-four seconds after the first and the third reclosure one and one-half minutes after the second. As the drum completes its cycle an auxiliary contact is closed momentarily. If any of the three oil switches are still open when this contact is made, that particular phase is "locked out" by a circuit-opening, hand-reset relay. The controller then comes to rest ready for another cycle.

The "locking out" of one or two of the phases does not affect the performance of the timer in reclosing the remaining phase or phases in the event of their being tripped out. The timer is started by the closing of a pallet switch on the oil-switch mechanism when it reaches the open position. The connections are so arranged that the tripping of a switch by means of a manual control will not start the timer and reclose the switch, nor is the timer operative for that particular phase until the oil switch is closed by the same manual-control switch. The value of this feature will be appreciated should an inspector intentionally open a feeder to clear a hazardous condition. The timers are so constructed that eight or ten fingers could be mounted on the drum and as many reclosures obtained. However, all of these reclosures would have to be made within the two-minute cycle, for when the motor is adjusted for a speed much lower than this the torque exerted is so weak as to produce non-uniform performance.

SUBSTATIONS CONNECTED BY LOOP FEEDER

This substation has a rating of 5,000 kva. and is located on Kingsbury Boulevard between the Page Avenue substation, which is on the west, and the Enright substation on the east. For better interconnection a 350,000-circ.mil, three-conductor cable from the Page substation running to the Enright substation is looped through the Kingsbury substation, as illustrated in Fig. 1. Primarily the substation was designed to receive three-phase, 60-cycle, 13,200-volt power and deliver three-phase, four-wire, 4,500/2,600-volt regulated energy distributed for both single-phase and three-phase service. However, equipment was also installed to distribute a portion as three-phase, 13,200-volt power to an ice plant in the immediate vicinity. The 13,200-volt bus receives energy from the transmission system over a No. 4/0, three-conductor cable "tapped" to the transmission cable which connects the Page Avenue substation to the power plant.

The building is constructed of red brick with a concrete roof. The location of the doors and the equipment is shown in Fig. 2. The ventilation is obtained by admitting air through a protected opening, 8 ft. x 10 ft., over the large door. Immediately beyond this opening is a baffle which deflects the air to 6 ft. above the floor, from which it passes the transformer and regulators and is discharged through a 60-in. ventilator through the roof.

In order to provide better means for equipment removal and at the same time keep the building cost down, two steel columns are extended through a hatched roof,

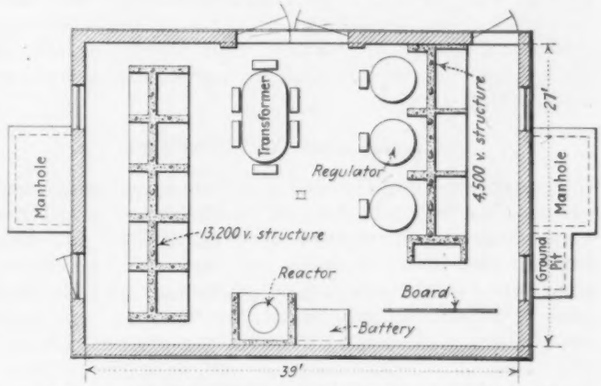


FIG. 2—ARRANGEMENT AND LOCATION OF THE MAJOR EQUIPMENT IN THE SUBSTATION

on which is mounted a cross-beam. This beam contains a lifting eye from which a 16-ton hoist may be hung. Upon removing the hatch roof the transformer core may be raised to clear the case. The case may then be rolled to one side and the core lowered into the building for inspection and repairs.

The transformer unit (see B in the halftone illustration) is of the three-phase core type having a self-cooled rating of 3,000 kva. and a water-cooled rating of 5,000 kva. The unit has head-block combinations for the following voltages: 26,400, 25,740, 25,080, 24,420, 23,760, 13,200, 12,540, 11,880/2,600-4,500-Y. The 4,500-volt leads of the transformer are connected, through disconnecting switches only, to the three single-phase automatic induction regulators having a range of plus or minus 10 per cent (shown in C, page 818), each having a self-cooled rating of 100 kva. and a water-cooled rating of 167 kva., which ratings correspond to the self-cooled and water-cooled ratings of the transformer. This arrangement makes the transformer and the bank of regulators integral. From the regulators the 4,500-volt power is connected, through disconnecting switches only, to the 4,500-volt busbars. This 4,500-volt energy is distributed over three No. 4/0, four-conductor cables treated as nine single-phase units, each unit being equipped with "disconnects," current transformers and a single-pole, 600-amp., 15,000-volt solenoid-operated automatic oil switch.

The neutral of the four-wire, 4,500/2,600-volt system is derived from the transformer neutral, which is connected solidly to a neutral busbar, to which is tied

the neutral of each of the three outgoing 4,500-volt feeders and one side of the regulator primaries. This neutral bus is connected to a ground plate embedded in charcoal and salt in a pit outside of the building. To this ground plate are also connected ground wires from all current and potential transformer frames, cases and secondary circuits, all disconnecting-switch bases, the main transformer and regulator cases, iron-pipe conduit, etc. The ground connections are carefully grouped and brought to the ground plate separately, so that no danger of high potential on apparently grounded units is present in the event that any equipment should break down.

Each phase of each incoming and outgoing feeder is equipped with a special lug directly above the pothead which permits the attaching of a ground jumper by means of a wooden appliance that may be safely handled. The cable leads may also be completely detached from the disconnecting switches and carry the ground connection with them. These lugs and jumpers may also be used to "double up" two of the outgoing 4,500-volt feeders on one set of switches, thus permitting any of the switches to be inspected or worked upon without interrupting service.

An Accessible Control Board

The control board consists of six ebony asbestos-wood panels (illustrated in D), on which are mounted the overload relays, control switches for the oil switches, current and potential links and terminals, automatic timers and their auxiliaries, watt-hour and demand meters, as well as equipment for "jacking" a single set of three ammeters into any of the current circuits. The control wiring consists of multiple-conductor braided cable with color tracers, installed in 1¼-in. iron conduit carried overhead from the various points in the station to the control board. Control current is supplied from a vehicle-type storage battery which consists of fifty-five cells. The battery is kept at maximum-charge condition by means of a motor-generator set having a direct-current capacity of 1.5 amp. at 140 volts. The generator of this outfit remains connected across the battery and charges continuously at approximately 0.4 amp., this being sufficient to overcome the losses in the battery and replace whatever may be taken from the battery for operations.

There are five 13,200-volt switch positions, all of which are equipped with H-3, 500-amp., 15,000-volt bottom-and-back-connected oil switches and installed in separate compartments, as shown in E. All oil switches are provided with indicators which show "open" and "closed" positions of the mechanism. All compartments are provided with doors made of ¼-in. corrugated asbestos lumber without wood frames. Where disconnecting switches are installed in compartments, all three doors of each set are locked together so that they are opened by a single motion. There is a 5 per cent reactor (shown in A), installed between the oil switch and the pothead of the 13,200-volt outgoing feeder, on account of the close proximity of the light type of switchgear in the ice plant and also because if this feeder is ever extended to include any appreciable amount of overhead line it is expected to make such arrangements as to reclose it automatically on "trip-out." The station lighting, regulator motors, motor-generator set, timers and other auxiliaries are operated from a bank of three 2-kva. single-phase transformers fed from the 4,500-volt bus.

Largest Radio Station in France Placed in Operation

THE new high-power radio station of Sainte-Assis, powerful enough to reach all points of the civilized world, was placed in operation by the French Government last July. It is not only the largest radio station in France, but one of the largest in the world.

The two main posts are erected on the river Seine about 40 km. from Paris. One is for continental communications, to cover England, Spain, Italy, Central Europe, the Scandinavian countries and the Orient, with a radius of approximately 3,500 km. The second contains much larger equipment and is intended for transcontinental use, reaching the United States, Canada, South America, South Africa, India, China, and Japan.

The equipment of the continental station consists of a main current supply from a 14,500-volt, three-phase trunk line from Paris, two 200-kva., three-phase transformers to reduce the potential to 500 volts, an emergency current supply from two Diesel-electric groups of 100 kw. each and one 450-amp.-hr. storage battery. Four 52-kw. motor-generators convert the three-phase current into direct current, which is required to drive the high-frequency generators. The latter are rated at 60 hp., 220 volts, 6,000 r.p.m., 32,400 cycles per second. This equipment corresponds to an antenna input of 25 kw. per generator. An umbrella-type antenna is supported by a steel tower 750 ft. in height.

In the transcontinental station the main supply of energy is also taken from the 14,500-volt, three-phase trunk line. Two 1,300-kva., three-phase transformers reduce the voltage to 3,000. Several smaller transformers, aggregating 200 kva., are installed for auxiliaries. For emergency supply there are four Diesel-electric sets, two of 1,500 hp. and two of 90 hp. One 460-amp.-hr. storage battery is employed. Two 1,150-hp. synchronous motor-generator sets change the three-phase current into direct current. The sets are started with an 85-hp. synchronous starting motor on one end of the main shaft, while the other end carries the exciter. There are in all four high-frequency motor-generator sets—two of 250 kw., 20,400 cycles, 310 volts, at 3,000 r.p.m., and the other two of 500 kw., 15,000 cycles, 310 volts, at 2,500 r.p.m. An umbrella-type antenna is supported by eight steel towers, each 750 ft. in height. Particular attention was paid to insuring an excellent ground connection, more than 150 miles of copper wire being utilized for the different grounds.

At Villecresnes, about 25 km. from Paris, six small buildings for reception were erected. The actual receiving by sound, mechanical or optical registration is, however, effected in the headquarters in Paris.

As it is very desirable not only to receive but also to send all messages directly from Paris without manual relaying at Sainte-Assis, a special cable containing fourteen pairs of copper wires was designed and laid between Paris, Villecresnes and Sainte-Assis. The characteristics of this cable are so chosen that it is possible to send over each wire without interference a telegraphic message at a rate of 100 words per minute while at the same time a telephonic conversation is carried on. The cable is Pupinized with an inductance every 3 km. Within the city limits of Paris the cable is laid out in underground ducts, while outside it is suspended on a galvanized steel carrier on wooden poles. This represents the first use of a Pupinized cable of an appreciable length (30 miles) in France.

Policies in Merchandising Appliances*

Existing Ignorance of Cost Is Dangerous—Business Being Done at a Loss—Uniform Accounting Methods Should Be Developed for Central-Station Use —Independent Dealer Should Be Protected, Encouraged and Developed

By JOHN F. GILCHRIST
Vice-President Commonwealth Edison Company, Chicago

IN THIS paper Mr. Gilchrist makes some statements that strike at the very roots of present central-station merchandising practice and point of view. It is plain talk from a man whose experience and judgment make him probably our foremost authority in these matters. He says that appliance sales in a community may be made to equal sales of electricity, that today most central-station companies are selling at a loss, that with the volume of business in prospect such losses cannot be countenanced. He has proved by investigation that the average central station is absolutely ignorant of merchandising costs. He states clearly the obligation of the light and power company to protect the local trade by maintaining proper policies and build up more prosperous dealers for the better service of the market. Mr. Gilchrist speaks of the "spread" on appliances and the influence of price on volume of sales and recommends that prices be increased—a debatable point discussed editorially in this issue. No more constructive paper has ever been written on the subject of central-station merchandising.

IN MOST communities the percentage of the entire number of electrical customers who are residence customers ranges from 50 to 90. We are beginning to calculate the possibilities in the sale of electric appliances in comparison with the income from the sales of electricity, and also with the sales per capita and per customer in the communities, for the purpose of comparing one community with another, so as to "get a line" on the possibilities of the business. Recently an enthusiastic merchandising manager in one of the large syndicates has optimistically predicted that it is quite possible for the sales of merchandise to the entire body of residence customers of a central-station company to equal each year the sales of electricity. While that statement at first seemed absolutely preposterous to the writer, familiarity with it and analysis has led to the conclusion that the merchandising business might easily be brought up to a figure which would be a substantial percentage of the residence electricity income, if not quite equal to it.

If we may assume that the average annual payment for electricity is in the neighborhood of $25 per residence, it makes it easier to accept this prediction, as it would seem not out of reason to demonstrate the economy and usefulness of electric appliances sufficiently to result in sales of $25 per annum per residence customer. If each customer purchased annually three or four of the smaller devices, it would amount to this, and in the case of articles as large as washing machines, the customers need be only one in five to one in eight of the electric light customers to have this device alone account for a volume equivalent to the lighting bills, so that we begin to realize that we are dealing with a business of no mean size, and one quite worth while cultivating, provided it can be done on a basis which is profitable, because when we come to consider business in such volume it becomes immediately apparent that the question of a sure merchandising profit cannot be overlooked.

It is possible that we could have afforded to look upon this business as more or less of a plaything and experiment when in volume it did not exceed 2 or 3 per cent of our total volume of central-station business, and could even afford to ignore losses or charge them up to advertising; but in any such volume as I have been discussing the necessity for profit becomes imperative. It is this feature of the business which particularly has called forth the inquiry and interest which is everywhere in evidence at this time.

We have discovered several important matters in connection with the business. In the first place, the merits of the devices are not so widely known that any large amount of sales can be expected from people who, on their own initiative, find their way into our stores. More than the ordinary amount of advertising is necessary, and in addition to that we must have salesmen who will go out among the people and demonstrate to them in their homes the advantages of becoming users of these appliances. This means more than the average amount of expense per unit of sales for advertising and selling which the ordinary retail merchant expects to assume.

In addition to these expenses, it has been found that, like furniture, pianos and other household equipment, this merchandise must to a large extent be sold on deferred payments if a reasonable volume of business is to be expected, which introduces more cost for the carrying of accounts. Study of figures in the case of the merchandise business of a considerable number of prominent central stations has led to the suspicion that the average cost of doing this business is somewhere in the neighborhood of 37½ per cent of the gross sales. At least, this is sufficiently evident to create a desire on the part of those doing any volume of business to get to the bottom of the matter and find out as definitely as possible what the exact cost is, because if this is the cost, it is quite evident that the great majority of institutions are doing business at a loss, and the "spread" which prevails between cost and selling price of this kind of merchandise is on the average decidedly less than it should be.

General Ignorance of Cost

It might seem to the well-organized merchant, who has long dealt with the question of profit on goods and who is so organized that he not only knows each night what his sales have been during the day, but also knows what the net profit on them is, that my statement regarding the desire of knowing what the cost is is rather

*Part of a paper presented at the convention of the Great Lakes Geographic Division of the National Electric Light Association at French Lick Springs, Ind.

strange and indicates a great lack of business sense and experience. But when I make this statement to a body of central-station men, who appreciate the fact that this business is done very generally as a side issue to the larger business of distributing electricity and by making use of many of the facilities of the larger business, it will be understood how really difficult it is to determine exactly what the cost would be of doing this business if it were an entirely separate business.

The central stations are no doubt more responsible than the manufacturers for the fact that there is not a proper expense and profit "spread" in the selling of these articles. When appliances first came on the market the central stations universally had very little idea of attempting to make a merchandising profit, their whole thought being that they could afford to sell this apparatus at low prices, and even take merchandising losses, in order rapidly to place a large amount of it on their circuits and derive the income from the sale of electricity which would result. This policy on the part of the central stations has misled the manufacturers, and the study of costs and the question of what "spreads" are essential to the retailer have been rather ignored. This undoubtedly is the greatest obstacle to the extension of the business at this time, because to too great an extent the central stations are only dabbling in these sales, and yet, generally speaking, they are putting out the appliances on such a basis that the independent dealer, even though he is fortunate enough to be able to purchase at as low a price as the central station, cannot possibly compete with the central station and live, the result being that there are relatively few of these dealers and their volume of business is small.

MUCH BUSINESS DONE AT A LOSS

A matter of first importance in handling this situation is the installation of proper accounting methods and segregation from other allied businesses, so that it can be determined how much gross profit is necessary if the business is to stand on its own feet. It is not only necessary that accounting be done, but it is necessary that standard methods of accounting be used, so that institutions may compare their costs one with another, and by producing a large number of examples can develop data which will be convincing, not only to the merchandisers themselves, but to those from whom they buy goods, and whose interests are being affected quite as seriously as the retailers if the margin to the retailer is insufficient to permit of his making a reasonable profit.

This, potentially, is now a great branch of our business, and it is thoroughly worth while that the ablest men in it should give a great deal of their attention to the question of a proper merchandising policy. We are altogether too prone to optimism in convincing ourselves on the most superficial information that we are making profits, and that we are a little more clever than other people and can sell lower and still make money. It is high time that we quit fooling ourselves and get down to a careful investigation of the entire matter.

Only recently I have had occasion to attempt to secure somewhat comparable figures from nine or ten of the central stations doing the biggest retail electrical business in the country, and it was necessary to send men to nearly all of these companies to work several days before it was possible to get any figures that were at all comparable, so as to make a half-way intelligent comparison of costs among companies. Many of these companies were serene in the belief that they were making money, but on obtaining a superficial analysis, it became evident that there was not a single company in the group that was really making any money. This was confirmed by the fact that two or three of the companies that did the biggest business and came nearest to knowing what they were doing were frank in admitting losses and the very great necessity of taking some steps to correct the conditions, but most of them are not convinced yet and are hesitating over the question of the necessity of developing a separate accounting system for this part of the business and the advisability of an accounting investigation, based on figures obtained under such an accounting system, to determine just what the losses are—this notwithstanding the fact that, basing inquiry on their own insufficient information, it should not take them long to convince themselves that they are losing each year many times any possible cost of such an investigation. This condition may not be very different from that existing in many businesses.

The Federal Trade Commission from its inception has contended that the greatest obstacles to the building up of profitable enterprises in the country is the very great lack of information as to details of costs of businesses which prevails everywhere, and a great deal of its energy has been directed toward the development of cost accounting plans which will put merchants and manufacturers in possession of information to enable them to guide their businesses properly. This great body has recognized almost instantly the absolute necessity of proper cost-finding systems, standardized throughout industries, to enable those industries to compare notes as to their costs.

That is the first thing which we want in this business. When we have that we shall be prepared to seek the remedy effectively. The remedy probably does not lie in any single change. In the first place, we must get our own houses in order and find ways of conducting this business in volume, with proper service to our customers, at the lowest possible cost. We cannot do this intelligently until we know our costs. This will not give complete relief, but it will help and will enable us to see that we must get higher prices for our commodities before we can make money, and particularly before the small independent dealers can make money. The greatest importance should be placed upon the necessity of a policy which will develop prosperous independent dealers. The central-station companies should be leaders in this matter of selling and distributing merchandise, but even if it were good policy to attempt to monopolize the business—and it is not good policy—they cannot begin to cover the field. Their best interests lie in developing a large number of prosperous, well-run, independent businesses, which will become broad distributors of the electricity-using devices that are becoming each year a more and more important factor in the income account of the central stations.

INFLUENCE OF LIST PRICES

When we come to the question of raising prices, there will be some details, such as the manufacturers' lists, etc., which must be straightened out. The manufacturers' list, which in many businesses is ignored, in our business seems to have a psychological effect in that in the minds of many of us it is the limiting high price which can be charged at retail, and it is true that if a manufacturer's list is widely advertised, so that the public is familiar with it, a retailer is open to charges

of profiteering if he attempts to obtain a higher price. This is particularly true because so large a number of dealers have learned to look on the manufacturers' list as the top possible price, and it would be a very strong dealer who, establishing his price above this list, might expect to influence others to adopt the higher price.

A third way of reaching a satisfactory situation will be through reduction of the manufacturer's or jobber's prices to the dealer. Personally I am not starting any clamor on this point, as I am convinced, generally speaking, that the manufacturers and jobbers have already done their share, but as we are undoubtedly in a long period of declining prices, we may from time to time expect some relief in this respect, while still leaving the manufacturer in as satisfactory a position as to percentage of profits as he is in now. What we want to urge on him particularly is to take advantage of this period to create more nearly a proper "spread" by holding his list prices where they are and reducing his net prices as his costs go down.

Washing-Machine Situation Typical

Getting down into a little detail, let us take the case of the washing machine as typical of the entire business. I want to quote this letter written about a year ago by a very able and intelligent dealer in one of the big cities of the Middle West who has had a great deal of experience:

> The average dealer's discount, as you are no doubt aware, varies from 25 to 35 and 5 per cent. The average dealer's overhead, as determined by the National Association of Contractors and Dealers, from stores in operation, is 28 per cent.
>
> Every family uses a cookstove, either gas or coal, and the discount to the dealer on cookstoves is from 40 to 60 per cent, varying with the make and quality of the product. Cookstoves sell themselves. Washing machines have to be sold and require not only an expensive sales force but expensive advertising as well. If the margin on washing machines was 50 per cent, every electrical dealer and contractor could be an outlet for the washing machines, but dealers today are only selling washing machines because they have listened to some persuasive argument of a good salesman, and not because they are making any money upon them.
>
> Checking up our own cost for the last year, taking the total machines sold at the selling price on the one hand and the cost of selling the machines on other hand, including the cost of the machine, the delivery charges, the advertising charges, the demonstrating charges and the servicing charges, we find that we paid each one of our washing machine customers during the year 1920 $8.22 for the privilege of selling the machine.

The only trouble with this gentleman's statement is that he has not done business in a big enough way to appreciate what all of the real costs are, and that in a big business they are actually much heavier than he states. Had he been doing business on a scale which would have required his going after it in the most vigorous way, he would probably have found that it had cost him $20 to $25 per machine for the pleasure of being in business, instead of $8.22. I think any of us who have done any analyzing will realize that the cost of selling washing machines is higher than the average cost of selling the general line of appliances. They must be sold on deferred payments, which means high cost of financing. In the selling of them the highest type of salesmen's service is required, if satisfactory results are to be obtained, and servicing, which custom dictates should be furnished free by the dealer, is costly.

Yet I can point out to you large companies which, generally speaking, have some ideas of making profits, and also some ideas of their responsibilities to the dealers, large and small, in their territory, which plume themselves greatly on selling a large number of low-priced washing machines at a gross profit of 33⅓ per cent, when their average cost of doing business on the entire appliance business is 37½ per cent. This means to me that their cost of selling washing machines is probably over 40 per cent. The central stations' own immediate loss of money is the matter of least importance in their transactions. The serious thing is that such policies check the whole washing-machine industry in a city by establishing in the minds of the people a standard of value of washing machines which will be hard to dislodge later and at which no well constructed washing machine can be sold without absolute loss to the dealer, to say nothing of a reasonable profit.

In my judgment, the central-station company, as a leader in the community, should pick out as its standard the highest grade of washing machine which it can find and charge a price for that machine which will cover its cost and such a profit that the small dealer can compete at the same price and make a reasonable profit; then put all the prestige and energy of the central station behind the article, knowing that every one of its customers who buys one will get good and fair value. They will get the best machine made, and get it on a basis which yields only a very reasonable profit to the distributor.

This will have the following result: Many of the independent dealers will sell lower-grade machines which go at a lower price. They will be able to sell more of them, and they will on this class of machines get a price which will let them out with a profit, and the washing-machine business will thrive and prosper in the community, because it will yield a profit which warrants the necessary effort to put out a lot of machines, and a lot of machines can never be put out in any community, even at a ruinous price, without a great deal of effort. The washing machine is something which the people do not buy. It must be sold to them. On the other hand, its very great value is evidenced by the fact that when a family has used one for six months, and has learned to appreciate thoroughly what it means in the saving of time, energy, good looks and clothes, you will find that there will not be an article of furniture in the entire home which they will not give up rather than the washing machine. This is only another illustration of my statement earlier in this paper that the public as yet does not know the value of electrical appliances, and when it does fully grasp the possibilities of efficiency, economy and help in raising the standards of living, this business will increase tremendously.

Experience in Chicago

Before we get off the subject of the washing machine, however, I want to take you into confidence. In my experience in Chicago we have been selling a machine for $192.20 which costs the Commonwealth Edison Company $94.50 in lots of five or more. When many of the other companies in more or less of a panic reduced their prices on washing machines, this company increased its price, as it had found that it was obliged to do so in order to sell a dependable machine and get out whole. Many of the people in the company, especially the salesmen, felt that the increase in price would cut down the sales very decidedly, but the reverse has been true, owing to the increased advertising and the increased salesmen's commissions which were possible. The company nets more money per machine, and sales

are practically double what they were eight or ten months ago under the former policy. In fact, this company is selling at this price more washers today in Chicago than are sold in the city of all other makes of washers put together, notwithstanding the fact that Chicago is one of the most highly competitive washing-machine markets in the country.

But now comes the point which I wish to make particularly. There were so many people in the company who believed that we were selling at too high a profit that the writer called in the services of unbiased expert accountants to analyze the washing machine business, and in Tables I and II are found the results for the months of June and July of this year in percentages. While some of the costs may be open to question, and while a lot of you may think that you can do business a great deal better than the company in question, they are the actual costs. To the very great surprise of every one, they showed that even on these higher prices the machines were being sold at a loss instead of a profit. You can well imagine that this was a very great shock, when we were proceeding from the standpoint of trying to justify a relatively high price, and I say to you here that, notwithstanding the opinions you have, if you will go into your figures and have your experts analyze them as thoroughly as in the company to which I refer, and get as broad a grasp of the situation, you will, I am satisfied, find that the final net profits on the washing machines you are selling are not on a satisfactory basis.

TABLE I—STATEMENT OF AVERAGE UNIT COST OF SELLING NEW WASHING MACHINES FOR THE MONTHS OF JUNE AND JULY, 1922

	June, per Cent		July, per Cent	
Average net selling price	100.0		100.0	
Average cost per machine sold	56.6		58.0	
Gross profit per machine		43.4		42.0
Average expenses per machine sold:				
Selling:				
Commissions	17.8		18.7	
Bonus	0.8		0.8	
Premiums	1.8		2.7	
Demonstrating	1.4		1.7	
Salaries, adjustments and sundries	1.6		2.2	
Delivery and salesmen's automobiles	4.0		5.7	
Repairs	1.1		1.6	
Total selling	28.5		33.4	
Buying	2.1		2.5	
Occupancy	3.6		4.2	
Publicity	4.9		4.6	
Administrative	8.5		12.2	
Overhead expenses	19.1		23.5	
Total expenses		47.6		56.9
Average loss per machine		4.2		14.9

The situation with reference to the sale of washing machines, while extreme, is more or less typical of the entire merchandising situation, and it is time for every one in the business to give careful attention to these features. The central stations, with all their influence and prestige, will do the industry an incaculable injury if they sell this merchandise on a basis that does not result in reasonable profits, and the fact that they do not know they are selling too low does not excuse them. They might better keep out of the business and turn it over to some one else.

VOLUME SALES NOT BASED ON LOW PRICES

There seems to be a very general feeling among merchandisers, and the less experienced they are the more they are subject to such convictions, that in order to get volume of sales prices must be made very low and that prices can only move in one direction—downward. Any effort to move them in the other direction, it is supposed, will dry up the business. This is a fallacy, particularly with articles of as much real merit and real demand as electrical appliances.

As a policy in merchandising, the central stations should stay in the business, and should be leaders in it, but should recognize the very great advantage to them of having a large number of independent dealers in the field, and with this thought in mind should shape their policy so that these dealers in fair competition can make and accumulate money and become strong and resourceful, provided that the intelligence and industry which they exercise in the prosecution of their business is such as should warrant success.

We want a reasonable profit for ourselves, and we want our contemporaries to make a reasonable profit, and if there is a tendency for the central station to make too much when goods are sold on a basis which will yield the dealer in competition a reasonable profit, the matter can readily be equalized by the central station assuming more of the burden of the necessary publicity.

If you are not doing 25 cents' worth of merchandise sales for every dollar's worth of electricity sales in your territory, you are not doing what you should be doing right now, and this business should grow faster in proportion than the business of distributing electricity.

REFUSE TO SELL WITHOUT PROFIT

In the doing of this business, perhaps the most important thing to watch is your gross profit. You will merchandise a small amount of goods which might be termed staples, the margin of profit in which is small and has been from time immemorial, but you will carry this more or less as an accommodation line, and your cost of carrying and selling will also be relatively low. However, the great volume of appliances of recent introduction, which constitute the bulk of your sales and which are the articles you push, must carry a good margin, and if they do not you should resolutely put your foot down and decline to handle them until they are presented to you on a basis where they do.

TABLE II—AVERAGE COST OF SELLING TYPE "L" WASHERS, TREATING PREMIUMS AS A REDUCTION OF PRICE INSTEAD OF A SELLING EXPENSE

	June, per Cent		July, per Cent	
List price	100.0		100.0	
Average allowance	1.2		2.9	
Average premium	1.7		2.5	
Average cash discount	0.3		0.6	
Average price reduction	3.2		6.0	
Average selling price	96.8		94.0	
Cost of type "L" washer	54.0		54.0	
Gross profit per type "L" washer		42.8		40.0
Expenses as above, exclusive of premiums		45.1		51.9
Average loss per type "L" washer		2.3		11.9

Naturally, you must pass into these situations gradually. The Commonwealth Edison Company in its merchandising policy is endeavoring to work to a point of 40 per cent minimum margin and to maintain a policy that it will not place any goods on its counters which carry less than this. It is encouraging to report that the manufacturers and jobbers have begun to understand and recognize the situation, and the trend of their prices is more and more toward a basis which will permit of the realization of such a policy.

Driving Accident Prevention Home

Comprehensive Suggestions Covering the Preparation of a Safety Code, Drawn Up by the Accident Prevention Committee, Were Made Before Convention of the New England Division, N. E. L. A.

ACCIDENT prevention work in electric utilities has advanced so rapidly in recent years as to challenge the attention of far-sighted executives. At the New London convention of the New England Geographic Division, National Electric Light Association, H. W. Moses, chairman of the accident prevention committee, presented an unusually comprehensive report upon the present situation in this field. The report pointed out that, although striking achievements have been absent, progress has been made. This committee has presented so much information of practical interest since 1913 that if its recommendations were studied and applied, there would be need for little further activity on the part of the signers of the report as such. In order to make sure that the properly interested parties receive the material sent out by the committee, a list of more than 150 persons directly interested in accident prevention has been compiled and is available for the succeeding committee. It is thought that this list will be helpful in establishing more intimate relations between the committee and the various companies, with resulting closer co-operation and prompter action in gathering and distributing accident prevention material.

PRACTICAL POINTS IN CODE WORK

Instead of a set of code rules, the committee feels that it may properly make the following suggestions to those having in mind the formation of a safety code or the revision of existing codal material:

1. The term "rule" is psychologically wrong. No one minds being instructed, but the worker today in general objects to having to follow a rule. Therefore the term "Safety Instructions" or "Safety Code" is better.

2. Safety instructions should not be confused by being incorporated as part of the general operating instructions of any company. Rather let them be drawn up as a separate book or pamphlet.

3. As far as possible, they should be written in the vernacular of the particular department to which they are to apply. Too often safety instructions read more like a page from some legal document.

4. Let them be written in the affirmative as far as it is possible, that is, point out what should be done rather than what should not be done.

5. Particular attention should be paid to the printing and arrangement. The rules for any one department should be segregated and considered in a separate section of the instructions. Sub-headings should be liberally employed and the rules applying to a particular sub-heading grouped under it.

6. Keep out any extraneous rules that do not apply to your company. A smaller number of carefully chosen rules, rigidly enforced, is better than dozens of ill-considered instructions that are ignored.

7. Make every effort to include no instructions that cannot be enforced. Some employees are very critical and are always on the lookout for such slips, which they use to discredit the entire set of instructions.

8. In drawing up a code of instructions be certain that all classes of employees are comprehended.

9. No code of instructions would be complete unless there is included the N. E. L. A. instructions for resuscitation.

10. After the instructions have been completed let them be thoroughly indexed.

11. Amend the instructions as often as changes in the art, additions to equipment or growth of the company warrant. When equipment with which employees are not familiar is to be added to the plant have the new instructions covering the use of this equipment issued before the equipment is placed in service.

12. In amending the instructions from time to time let the entire staff co-operate in compiling the changes.

13. Let it be known that suggestions from any employee as to the workability of existing instructions or the desirability of new ones are always welcome. When such suggestions are made, make certain that the employee making them is finally advised of the disposition of his ideas.

14. Keep a "weather eye" out for additional worth-while rules gleaned from the experience of other companies.

15. After instructions are once issued it is important to keep everlastingly at the enforcement of them.

16. Some sort of periodic "follow-up" of safety instructions should be prescribed. This may take the form of periodic examinations of individual employees as to their knowledge of the rules, or of systematic talks by officials.

17. Enforcement of safety instructions will be easier if employees are taught to realize that the instructions are primarily for their protection rather than for the protection of the company. The company can replace material and even men lost or injured through accident, but the man cannot replace that which he himself has lost.

18. Safety instructions should be tied in with safety bulletins when an accident occurs. Immediately a suitable bulletin should be posted directed against this type of accident, and along with each bulletin may well go a copy out of the instruction book of the instruction which, if it had been observed, would have prevented the accident.

19. Let the public know that you have a code of safety instructions and that its purpose is to protect life and property not only of employees but of the public as well.

In addition to the above general suggestions, recent accident experience would seem to point to laying particular emphasis on the following:

1. *Supervision.*—Special attention should in some way be directed, either by the use of heavier type or by underlining, to the rule or rules instructing employees that they must be properly supervised in any work they are to undertake.

2. *Pole Handling.*—More complete instructions for handling poles are desirable. These should be dictated by careful experience and observation of actual practice.

3. *Resuscitation.* — There should always be included a provision whereby the "prone-pressure" method should be practiced at least once a month.

4. *Automobile Operation.* — The continually increasing number of automobiles operated by member companies make it desirable—in fact essential—that there should be included a section covering the safe operation of automobiles on the highways, together with instructions directed toward the elimination of garage hazards.

5. *Construction Hazards.*—While these have been recognized for many years, nevertheless continued and greater emphasis should be placed on any rules covering such hazards.

6. *Rubber Gloves.*—Rules covering the use of these should provide for the use of protective gloves over the rubber gloves.

7. *Fire Prevention.* — Fire prevention being a part of accident prevention work, no safety code may be considered complete without a section directed toward the elimination

of fire hazards, periodic inspection of premises, proper methods of fire protective apparatus and establishment of fire drills.

8. *Fuel Oil.*—With the increased use of oil for fuel in place of coal, a section should be included, where such oil is used, providing safeguards around the oil storage, oil-pump rooms and in boiler rooms.

9. *Office Hazards.*—Too little attention has been paid in the past to eliminating the various hazards existing in and around company offices. A section dealing with such hazards should form a part of every safety code.

10. *First-Aid Kits.*—A section should be included covering the make-up, inspection and use of the standard N. E. L. A. first-aid kits.

The report also urged the association of past committee members in some way with active members to strengthen and perpetuate the work. Once safety work has been started in a public utility, it is seldom or never set aside At present comparisons of data are difficult between companies because of lack of uniformity in statistical records. The committee recommended the preparation of a uniform accident report blank for general use by members of the New England Division.

Continued Executive Interest Helps

Lack of executive support has hampered accident-prevention work in many cases. There is a too general belief that the cost of accidents is a fixed charge, or a tendency to think of accident prevention in terms of insurance premiums. The premium asked by the insurance carrier is paid by the employer, who feels oftentimes that he is thereby released from any further obligation or worry about the matter for at least another year. This is a short-sighted policy. There is a slow but gradual tendency to broaden the application of the compensation laws. The waiting period is shortened, the benefits are increased, medical services are more liberal, and, generally, there is a broader interpretation of the application of the law. This results in an increase in the cost of accidents, and hence in larger premiums. Accident costs may be reduced by preventive measures based on experience, and the committee urged the consideration of this subject by executives.

Other needs pointed out in the report were the greater use of safety devices, closer tabulation of causes of lost time due to illness, further study of fire hazards and protection of valuable records, extension of training in the prone-pressure method of applying artificial respiration in case of electric shock or drowning, increasing regard for safe motor-vehicle-operating methods on highways and elsewhere, reduction of hazards arising from improper or inadequate illumination, protection of distribution lines against makeshift radio aërial construction, proper inspection and upkeep of stairways and railings leading from hydro-electric plants to dams, forebays, etc., rigid supervision of live-line maintenance, better inspection of pole lines and educational efforts along accident-prevention lines for the benefit of the general public and school children. Concluding, the report cited the following rewards of safety work: (1) increased efficiency; (2) elimination of waste; (3) conservation of cash; (4) cutting of production costs; (5) saving of life; (6) promotion of better health; (7) reduction of injuries and mistakes; (8) development of standards of design and construction; (9) more clearly defined operating, distribution and maintenance methods.

President Frank W. Smith in discussing the report at New London complimented the committee on its work, characterizing the report as one of the best on accident prevention which he had heard in the past few years. Safety work lagged under war pressure, Mr. Smith said, but excellent results have come from its revival on his own company system, that of the United Electric Light & Power Company, New York. This company has an accident committee of thirty members, with monthly meetings usually devoted to an all-day discussion of accident problems. Representatives of the different departments below the rank of the higher executives attend. One committee member represents the company's insurance trustee. When it is feasible, employees who have been directly concarned in accidents are invited to tell their experiences and views to the committee in the interests of future safety.

H. T. Sands, Tenney companies, Boston, described a recent "safety-first day" conducted at Springfield, Mass., by the New England Telephone & Telegraph Company. A feature of this was a demonstration of what should be done to prepare a man struck on the street by an automobile for removal to the hospital before the arrival of an ambulance. An instance of the great value of instruction in the prone-pressure method of resuscitation was cited by Mr. Sand. A day or two after two of his linemen had been instructed in this work they saved the life of an employee who received a shock in attempting to reinstall a switch in a high-tension terminal house. The nearest doctor was seven miles away, but the short intensive training these men had received enabled them to prevent a fatality, and the victim of the accident is alive and working today.

C. R. Price, New Bedford, Mass., said that his company has succeeded in reducing its accident insurance premium through organization for better preventive work. Dr. E. W. Bullock of the New England Telephone & Telegraph Company, who gave a fine demonstration of the prone-pressure method at last year's New London convention, visited New Bedford by request to give instruction along the same line, and representatives from the local fire and police departments were present.

Deadly Risk of Suspending Treatment

Fire and police department members, as well as physicians, should be made mere familiar with the prone-pressure method of resuscitation, declared C. H. Parker of the Boston Edison company. Grave danger to victims of shock may arise if utility men are forced to suspend prone-pressure treatment before revival has been sufficiently established, J. A. Vahey, Boston, held. H. Burgi, Portland, Me., said that the local city government has appointed a committee on this matter, and Chairman Moses stated that it is hoped through the Massachusetts Safety Council to get the value of the prone-pressure method before the police and fire chiefs and the medical examiners of the state during the fall.

Financial Plans for the Development of Austria's Water Powers

AS ALREADY noted in the *Electrical World*, during the last few months great progress has been made in paving the way for the exploitation of the Austrian water powers in generating electrical energy. The technical part of the problem concerns the utilization of natural resources which, if properly exploited, could furnish up to 3,000,000 hp.

Up to the present time three great enterprises have been initiated, which will respectively develop water powers to serve Vienna, Upper Austria and Styria. These are the Upper Austrian and Styrian Water Power & Electric Company at Linz and Graz and the Vienna Water Power Company at Vienna. The capital of the Styrian company is 600,000,000 crowns, that of the Vienna company 500,000,000 crowns and of the Upper Austrian company 300,000,000 crowns. These figures, however, represent only the cost of construction for the first year, and all three companies have announced already the issue of additional stock. The financing plan of the three companies shows uniform features.

The water-power shares issued by the companies are in many respects a novelty not only on the Austrian but also on the Central European stock market. The nominal amount of the shares (200 and 400 crowns) is, even for Austria, extremely low. Another new feature of the Austrian water-power shares is the guarantee of a dividend of at least 6 per cent. Through this guarantee the shares become in fact dividend-paying bonds, which was made possible only by the Austrian State renouncing its right to tax the companies.

Letters from Our Readers

A Place Set Apart for Suggestions, Comments and Criticisms, to Which All Men of the Electrical Industry Are Cordially Invited to Contribute

Why Electrical Men Should Say "Luminaire"

To the Editors of the Electrical World:

For some years progressive illuminating engineers have felt the inadequacy of the words "fixture" and "lighting fixture." Years ago, when gas began to supplant oil lamps, the word "fixture" seems to have become a term descriptive of a section of more or less ornate gas pipe, extending from the wall or suspended from the ceiling, and supporting one or more burners. In this connection the appropriateness of the word was never questioned. Nothing could be more "fixed" than the old-fashioned gas-pipe fixture.

But as the scope of the lighting field widened and electricity began to usurp the place of gas for lighting purposes, the "fixed" character of a lighting unit gradually lost its significance. Electric lighting, always flexible in character, has in recent years greatly increased its range of adaptability; but the terms used to describe the lighting units have not undergone a corresponding evolution. The word "fixture" may have been suitable for the gas age, but in neither its original nor its commonly accepted meaning is it suitable for use in connection with modern electric lighting practice.

The objections to "fixture" are three in number. First, when we examine the word from a lexigraphic point of view, we find that a fixture is "a movable that has become fastened to anything, as to a house." Such being the case, a fixture is not a fixture until it has been fastened to something or permanently installed in a certain place. What, then, is the thing that one buys at the dealer's store? If it is not a fixture until it is installed in its appointed place, what is it, and if so, why? The easiest escape from this quandary is to use the new word "luminaire."

Second, if we are to ignore the dictionary meaning of "fixture" and use the word in its hitherto commonly accepted sense to mean simply a lighting unit, why do we not also call the type of lighting unit commonly used on tables or desks a fixture instead of a lamp? The reason is the same as that which now hinders the dropping of "fixture"—an inbred reluctance to use a new name for a new object. For centuries before the advent of electricity a vessel containing oil and supporting a wick was called a lamp. The so-called electric table lamp is not a vessel and has neither oil nor wick, but it has begun to occupy to a large extent the place that the oil lamp formerly filled. Is that any reason, however, for calling it by the same name?

Third, the hitherto accepted meaning of the word "fixture" implies a condition of immobility that has a harmful reaction upon the manufacture of luminaires. If the public continues to retain the idea that "fixtures" must always remain "fixed" and cannot be changed, they will let them remain in their homes and business places despite the fact that they may be antiquated, inadequate or unsuitable for their purpose.

In an effort to correct the incongruity of this situation the word "luminaire" has been adopted. Luminaire is equally suitable for describing a pendent, wall-type, ceiling-type or portable lighting unit, or any device intended to dissipate artificial light. Luminaire was selected from among a number of terms submitted to the committee on nomenclature and standards of the Illuminating Engineering Society, and its adoption by that body has since been concurred in by the leading lamp manufacturers, engineering societies and the lighting profession generally.

The term "luminaire" is not coined nor in use as a trade name. It is easy to pronounce and is used with a similar meaning in the French language.

Pittsburgh, Pa. M. REAST.

Salesmanship and Engineering

To the Editors of the Electrical World:

The writer has read with interest your recent editorial on "Salesmanship and Engineering," and it seems to him that you have omitted from consideration in this article one very important factor, especially as applied to the electrical industry; that is, the engineer salesman or the sales engineer. The little company with which the writer is associated represents a number of Eastern manufacturers, and in every case the man who is responsible for the sales is a trained engineer. This, we believe, is the solution of the problem stated.

Certainly there are a great number of men who have the technical qualifications and ability to be designing engineers and yet who by nature and inclination prefer contact with the public and general commercial business rather than the strict routine of engineering. More of this type of men can be developed, and their efforts will go a long way to protect the customer's interest as well as that of the company.

It seems to the writer that pure salesmanship should go just as far in protecting the interest of the customer as pure engineering. The salesman who does not have the best interest of his customer at heart and is thinking only of his sales record is almost in a class with the old-time central-station company which did not have the interest of the public at heart.

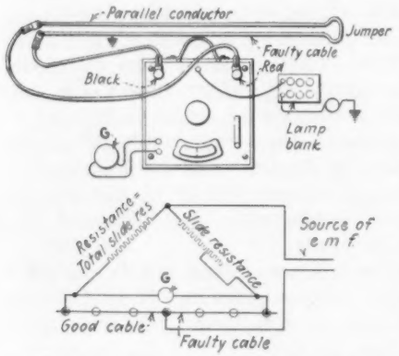
White & Converse, Minneapolis, Minn. CLOVIS M. CONVERSE.

Industrial and Station Practice

Installation, Operation, Test and Repair of
Generating and Distribution Equipment and Methods of Economically Utilizing
Electrical Energy in Mills and Factories

Portable Cable Fault Localizer

TO BE satisfactory any method of locating cable faults must enable the determination of the position of the fault with reasonable accuracy and in addition must be promptly and easily applicable by the regular station force without the necessity of calculations. The equipment shown in the accompanying illustration amply fulfills these requirements and is applicable to nearly all forms of cable failure.



PROMPT LOCATION OF TROUBLE REDUCES THE TIME FEEDER IS OUT OF SERVICE

Above—Connections for fault localizer. Below—Schematic diagram showing wiring connections.

In operation the device applies a certain, but not necessarily constant, amount of direct current to the grounded conductor and one other similar conductor on which there is no fault. The connections of the fault localizer are as shown in the illustration, the arrangement of resistors in the equipment being such as to produce in effect a Wheatstone bridge. As the knob is turned the resistance in one leg of the Wheatstone bridge is varied. The good cable is in the other leg, so that when the instrument is adjusted to the zero position of the galvanometer the location of the fault is read off directly in terms of the percentage of the distance from the point where the test is made to the total length of the cable. The percentage location of the fault is then referred to the record for that particular feeder, which gives the location of each manhole throughout its length in terms of the percentage of its total length. The manhole nearest in agreement with the percentage derived from the fault reading is the approximate location of the fault. In practice it is found to be unnecessary to read closer than the nearest manholes, which are usually spaced from 200 ft. to 300 ft. apart.

One company has had these instruments in use since 1915, within which period there have been forty-three high-tension feeder failures. Of this number, two were of such a nature that the fault localizer could not be applied. Of the remaining forty-one, one fault was located four manhole lengths from the point indicated, four were found two manhole lengths off, and the remaining thirty-six were in or near the manhole indicated. All these readings were made by the regular operating staff immediately following the fault, and all of them within about fifteen minutes after their occurrence, except in some cases where the resistance of the fault was so high that a testing set had to be employed to burn it down.

S. D. SPRONG,
Vice-President and General Manager.
Orange County Public Service Corporation,
New York, N. Y.

Adequate Protection for Linemen

AS THE result of careful study, some excellent safety rules for the protection of men working on transmission and distribution lines have been adopted by many of the large steel companies. A good proof that the principles followed are sound is that the rules of almost all the companies were found to be practically identical by the safety committee of the Association of Iron and Steel Electrical Engineers as stated in a report made at the convention in Cleveland on Sept. 11 to 15. Some of the rules are given in the following paragraphs.

When more than one gang of men are working on the same circuit all safeguarding conditions must be separately complied with by each and every gang. Station operators must be notified, preferably in writing, by some one in every gang intending to work on the circuit.

Station operators will open all oil and disconnecting switches involved, lock the control switches, place a sign on them bearing the names of all men ordering circuit off, and then notify such men that the above conditions have been complied with.

When these conditions have been complied with all three phases of each line that is to be worked on shall be grounded and short-circuited on both sides of the place where the work is to be done. This can usually be best accomplished by the use of a chain provided with an insulated handle and a place for making a ground attachment, which attachment must be made before throwing the chain over the wires or conductors.

When the work has been completed all shorts and grounds must be removed, after which the man or men who ordered the circuit off shall notify the station operator that the line is clear and ready for operation.

The station operator has absolute authority in regard to closing switches which have been opened for the purpose of working on the circuit, and he shall obey no orders to close oil or disconnecting switches or unlock control switches until after he is absolutely sure that all men who have given notice of their intention to work on the circuit have reported to him that so far as they are concerned the circuit can be put into service.

Notification to station operator to cut a circuit out of service should preferably be made in writing. Notification to put a circuit on must be made in writing.

Station operator shall notify his relief in regard to the conditions relative to any circuits which are out of service and also give him in writing the names of all men who have reported as working on such circuits.

In case a workman who has noti-

fied the operator that he is working on a circuit should for any reason leave his job in charge of another, both he and the man taking his place shall report this fact to the operator.

FIELD EDITOR ELECTRICAL WORLD.
Chicago, Ill.

Ornamental Lighting System Installed for $100,000

EVEN in these days when so many cities and towns are realizing the necessity of better street illumination and are installing new and improved types of lamps and standards in large numbers, the discarding of its entire street-lighting system by a municipality and replacing it with a new one is sufficiently interesting to make it worthy of remark. The city of Mandan, N. D., which has a population of about 4,600, has done this and in so doing has attained the distinction of having probably more ornamental lamp standards than any other place of anything like the same number of inhabitants. It has 447 in use, or approximately one to every ten inhabitants.

For a number of years its streets were lighted by fifty arc lamps, which have now been replaced by a system that is coming into very general favor—"Mazda" lamps inclosed in ornamental globes supported by ornamental iron posts. The change has been made at a cost of less than $100,000, while the gain in the appearance of the city and in the efficiency of its street lighting has been extremely noticeable and gratifying.

The lighting units are of the Novalux type, being made by the General Electric Company. In the business district the Form 9 unit, with diffusing globe, glass canopy and series film socket, is used. In the residential sections Form 8 is employed, the equipment being similar to that used in the business district. Ten-and-one-half-foot ornamental iron standards and 100-c.p. lamps are used in the residential sections, and 12-ft. standards and 250-c.p. lamps in the business district. The standards are uniform in design in both the residential districts and the business section and are of graceful and pleasing pattern, as may be seen from the accompanying illustration. The system is arranged and operated in four circuits, that of the business district being separate from those of the residential sections, and in each case the corner lamps are on a different circuit from the intermediate lamps.

Mandan has about 9½ miles of street lighting and 3½ miles of paved streets. A number of standards were, of course, installed along unpaved streets. In these cases the posts were placed on the curb line at what will be the grade and street line when the street is paved, and 6-ft. sections of curb were set in for protection. All the cable was laid 12 in. below the paving grade on unpaved streets, just under the edge of the sidewalk where the sidewalk extends to the curb, and across streets at right angles to the center in 2-in. iron conduit pipes. All pipes crossing paved streets were pushed across, and no pavement was cut. It is interesting to note that in making the installation, approximately two carloads of cement, 1,200 cu.yd. of concrete and 140,000 ft. of No. 8 single-conductor cable were used.

All the lamps are operated until 9:30 p.m. The corner lights are then turned out and only the intermediate lamps are burned until morning, except on Saturday nights and special occasions, when the entire system is operated. The cost of maintenance and operation is paid out of the general fund for street lighting made by the usual levy. Power for operating the system is supplied by the Mandan Electric Company, a privately owned corporation, but the city installed and owns the switchboard panels, meters, etc. The lights are controlled by employees of the company under the direction of the City Commission. The rate paid is 5 cents per kilowatt-hour.

ORNAMENTAL LIGHTING SYSTEM REPLACES ARC LAMPS IN MANDAN, N. D.

The lighting schedule and the consumption of current for the first half of 1921 were as follows:

	Kw.-Hr.
January, 5:00 p.m. to 7:00 a.m.	11,750
February, 5:30 p.m. to 6:20 a.m.	10,080
March, 6:00 p.m. to 5:00 a.m.	8,540
April, 6:30 p.m. to 4:00 a.m.	7,470
May, 7:00 p.m. to 3:00 a.m.	5,500
June, 8:00 p.m. to 2:40 a.m.	5,400

The job was divided into three contracts, other districts petitioning for

the improvement after the first contract was under way. The total price for the three was $95,721.84, including engineering, assessing and advertising as required by the laws of the state. The cost of the installations was met by special assessment against the property directly benefited by the lighting system.

ALL LOTS EQUALLY BENEFITED BY IMPROVED LIGHTING

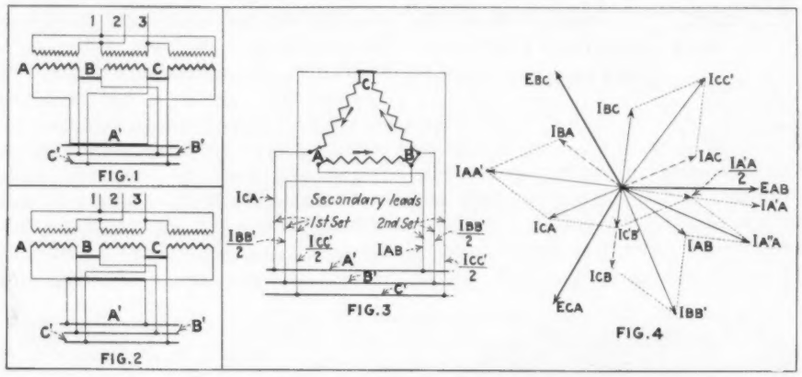
It had been decided by the special assessment commission that all lots were equally benefited whether or not there was a light directly in front of the lot or opposite, provided that they were equally spaced on the street around the entire block. The cost per lot was higher on the last two contracts let, and the average of a 50x140-ft. lot in the residential section on the main contract was $90.16, and on a 25x140-ft. business lot, $48.63, these costs being based on cash payment. The assessment was spread over a period of five years and warrants were issued bearing interest at a rate of 6 per cent. In the residential section the assessment commission held that a corner lot received no more benefit than an inside lot, even though there might be lots on the side; but in the business district the corner lots stood the cost of the light on both sides.

P. B. REED.
Lighting Specialist.
General Electric Company,
Minneapolis, Minn.

Careful Inspection Avoided Trouble

ANY plans for work involving considerable electrical energy need careful examination by some one who from experience is capable of passing judgment on the installation. Especially does this apply when the conductors carrying alternating current must be placed in a single conduit to prevent excessive heating and choke-coil effects. The following example of how such sources of trouble have been averted may prove instructive to any one encountering this problem.

Three 100-kva. 2,300/230-volt power transformers were to be installed in a substation and connected delta-delta. For uniformity the underfloor ducts in the building were all 3-in. metal conduit. One duct was provided for the primary leads from the oil switches at the rear of the switchboard, and two for the secondary cables from the transformer bank to the power-feeder panel, a running distance of about 25 ft. The secondary full-load current approximated 754 amp., so in order to avoid using the larger sizes of cables two separate sets of leads were planned from the delta through the conduits provided.



HAD NOT TRANSFORMER CONNECTION BEEN CHECKED, EXCESSIVE HEATING AND CHOKE-COIL EFFECTS WOULD HAVE OCCURRED

Fig. 1—Wrong connection in splitting delta loop through conduit. Fig. 2—Proper connection, avoiding this trouble. Fig. 3—Means of analyzing current unbalance. Fig. 4—Graphical solution of unbalanced currents in each wire.

The installation foreman, finding the space restricted for making the secondary delta, proposed to connect the two sets of leads as shown in illustration No. 1, thus forming two of the loops at the transformers and the third at the power-feeder panel. Before his proposed connections were installed, however, it was evident that trouble was in store because of the separation of the loops, and the entire delta was installed above the transformers, thus giving both sets of leads a balanced three-phase loading, as shown in illustration No. 2.

The unbalanced conditions which would have resulted had the proposed unsymmetrical arrangement of cables been adopted are indicated by an inspection of illustrations Nos. 3 and 4.

The coil current I_{CA} passes to the bus A' by one conduit and the coil current I_{AB} by way of the other. They are 120 deg. out of phase and should unite at A by a short loop similar to those at B and C; otherwise these two coil currents if run separately without such a local loop, would cause a heavy self-inductance in the two metal conduits. Stated another way, each of the leads from B or C carries one-half of the line current from these loops, while the cables from A to bus A' separately carry the whole of the coil currents I_{CA} and I_{AB}.

The instantaneous inequality of these currents and their phase relations are graphically shown in illustration No. 4. Here the secondary voltages, E_{AB}, E_{BC} and E_{CA}, are laid off symmetrically 120 deg. apart. The coil currents I_{AB}, I_{BC} and I_{CA} are also plotted 37 deg. lagging for an assumed load of 80 per cent power factor. The line currents $I_{AA'}$, $I_{BB'}$ and $I_{CC'}$ taken from the loops at A, B and C, with assumed symmetrical connections, are then plotted from the three vector equations:

$$I_{AA'} = I_{CA} + I_{BA} = I_{CA} - I_{AB},$$
$$I_{BB'} = I_{AB} + I_{CB} = I_{AB} - I_{BC},$$
$$I_{CC'} = I_{BC} + I_{AC} = I_{BC} - I_{CA}.$$

The sum of these for symmetrical loading equals zero, and there is no unbalanced flux. But with the wrong connections of illustration No. 1, the line currents $I_{BB'}$ and $I_{CC'}$ combine vectorially to give $I_{A'A}$; one-half of this, $\frac{1}{2}I_{A'A}$, combines vectorially with I_{AB} at one instant, to give the unbalanced current $I_{A''A}$, and with I_{CA}, simultaneously, to give the unbalanced current $I_{C'B'}$. $I_{A''A}$ scales 785 amp., while $I_{C'B'}$ is $\frac{1}{2}I_{CB}$, or 217 amp.

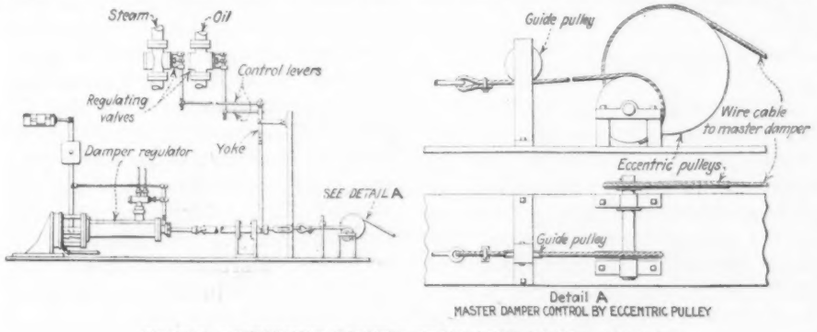
Such unbalanced currents are of sufficient magnitude to induce a considerable reactance in the divided circuit, and besides the resulting heating effect of the metal conduits, would appreciably unbalance the three-phase circuits taken from the power panel. This example of possible wrong cable connections emphasizes the importance of carefully inspecting all field construction, and especially of having men in the field who know how to execute office plans.

THOMAS M. ROBERTS,
Power Plant Engineer.
Bureau of Yards and Docks,
Navy Department,
Washington, D. C.

Easily Rigged-Up Regulator for Oil Boilers

WHERE firemen were forced to change burner settings quite often on oil-burning boilers because of variable railway load, the Northern Texas Traction Company rigged up an unused Mason damper regulator with two regulating valves to govern the oil supply automatically. The plant had been installed with no automatic devices other than an oil-pump governor, and owing to the commercial depression following the war expensive automatic boiler-equipment was not felt to be justified.

The regulator and valves were assembled as shown in the accompanying illustration, except that the cable pulleys were both concentric. In operation it was found that the master damper was too sluggish in opening at times when fires had been reduced to a minimum with sudden demands for steam coming on. Under these conditions the furnace smoked badly for a few seconds or until the gases attained sufficient velocity to enable air to be drawn into the furnace. To overcome this trouble the pulley carrying the cable to the master damper was made eccentric and assembled as shown in order to get a quick movement of the damper when the regulator turned on oil and steam. This arrangement entirely prevented smoke and reduced the CO_2. Some little experimenting had to be done in order to find the right position of this eccentric pulley on the shaft. Very satisfactory service is now being given from this apparatus. The CO_2 charts show very close regulation of air from boiler ratings of 40 to 200 per cent.



SIMPLE AUTOMATIC DAMPER REGULATOR TAKES CARE OF VARIABLE RAILWAY LOAD SATISFACTORILY

At first the steam line to the regulator was taken from the main steam header, but it was found that the regulator responded to every variation in load on the plant, which kept the regulator in constant motion. This was caused by variations of pressure in the header. A great improvement was obtained by taking steam for the regulator from the drums of the boilers, the pressure not varying nearly so much in the drums as in the header with changes of load on the station.

This apparatus cost practically nothing as it was made up of old material.

E. L. WHITE,
Chief Engineer.
Northern Texas Traction Company,
Handley, Tex.

Regulating Hydro-Plant Reservoirs

WHEN a number of hydro-electric power plants are on a stream at various distances from a storage reservoir it is important to so operate the reservoir that the maximum benefit to the power developments on the stream as a whole will result. Owing to the inflow of tributary streams below the reservoir, equal regulation cannot be obtained at all plants, consequently each reservoir must be so operated as to produce as far as possible a certain degree of regulation at some definite point on the stream. Under ordinary conditions the greatest benefit due to storage will result from taking the point of regulation near the middle of the power section of the river.

There are two methods of operating storage reservoirs. The first is the insurance method and is in general use for the operation of reservoirs for regulating the flow of water for water supply for domestic purposes, where it is necessary that a predetermined minimum flow be maintained, the aim being to utilize the available storage to increase the dependable flow. In carrying out the "insurance" method studies would be made to determine what flow could be maintained by use of the reservoir in question in the driest year. After the amount of this flow has been determined no water would be released from storage until the stream flow at the point of regulation had fallen below the determined amount. An objection to this method of operation, from the water-power point of view, is that in all years except the driest the benefit obtained from the reservoirs would not be so great as might be possible, and in some years little or no water would be released from storage.

The second method, sometimes known as the utilization method, aims to utilize practically all the available storage each year without special regard for maintaining a certain minimum regulated flow. In carrying out this latter method water would be released from the reservoir just as soon as the natural flow of the stream fell below the amount which would run the plants at full capacity, and this flow would be maintained continuously until the reservoir had been completely emptied. The objection to this method of operation is that in extremely dry years the reservoir might be emptied before the end of the drought and only the natural low flow would be available until the succeeding spring floods.

It is entirely feasible to so operate storage reservoirs as to obtain the good features of both of these two methods of operation, and a method of operation can be deduced providing for a rate of release of the storage so as to produce as nearly as possible a uniform flow at the point of regulation. In this way the assurance of a certain minimum flow would not be unduly sacrificed, yet practically the entire volume of stored water could be used every year, excepting the extremely wet years, which are of very infrequent occurrence. As a foreknowledge of the stream-flow conditions is assumed, it might be thought that this method is impracticable. However, it is thought entirely feasible to approximate closely this assumed method of regulation where reliable stream-gaging records are available for a considerable length of time, say over a period of ten years.

The above information was taken from the report on the water power and storage possibilities of the Hudson River made under the direction of the New York Water Power Commission.

FIELD EDITOR ELECTRICAL WORLD.
New York, N. Y.

Central Station Business

Advertising, Selling and Service Methods
Commercial Organization and Management, Customer and Trade Relations, Public and Financial Policies, and Reports of Company Plans and Experiences

What a Store-Lighting Survey Shows*

Only 25 per Cent of Chicago's Retail Stores Have Adequate Illumination—How a Definite Sales Program Increases Revenue of Lighting Department

By OLIVER R. HOGUE† and JAMES J. KIRK‡
Commonwealth Edison Company, Chicago, Ill.

IT HAS been said that a good sales manager is a man who decides quickly and who is sometimes right. Probably 90 per cent of the answers "yes" or "no" given by the central-station sales manager are based upon opinion rather than on fact. He is usually forced to decide quickly, and his one hope is that he will "guess right." The reason he has to "guess" is that he hasn't heretofore had available data upon which to form a correct opinion quickly. This was demonstrated conclusively during the period of depression from which we are now emerging.

With the industrial slump of May, 1920, the Commonwealth Edison Company found that it had to have more lighting business. Other central stations found themselves in like situations.

Following a survey of its commercial lighting business, we found that we did not know our market thoroughly. This investigation not only revealed the possibilities in the way of new business along the lines we had been following, but at the same time showed us where we could develop new fields.

We had been concentrating our effort on selling better lighting to the merchants who we thought needed it, with indifferent results. When we completed our second investigation, we found that we could, with less effort, do more business with the merchant who already had good lighting. The result has been a pronounced increase in our business.

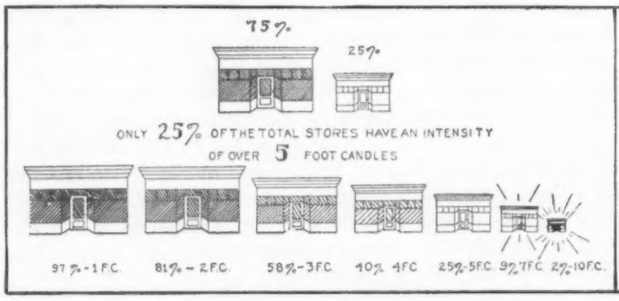


FIG. 1 —EXTENT OF UNDEVELOPED FIELD

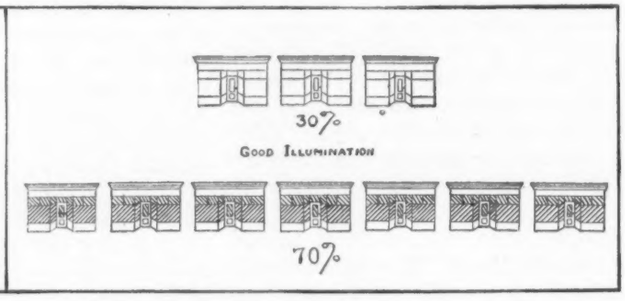


FIG. 2—SEVENTY PER CENT OF STORES HAVE POOR LIGHTING

THE FIRST SURVEY

In the 1921 survey of store-lighting conditions in Chicago, we obtained positive information of the enormous lighting possibilities. In Chicago there are 23,000 retail stores on the ground level. In order that we might get at average conditions, stores of like character in similar locations—in business sections on the North, West and South Sides of the city were decided upon. An equal percentage of stores of each class in each locality were visited. An engineer was assigned to each section. The data were obtained by the use of a foot-candle meter and by observation, and a questionnaire was submitted to the owner of the store. It was necessary to visit more than a thousand establishments before satisfactory data were obtained.

The following list shows the kind of stores that were visited: Dry goods stores, candy stores, bakeries, tailors, meat markets, restaurants, groceries, furniture stores, drug stores and cigar shops.

The same percentage of stores of a given classification of the total number of stores of that classification were visited. Of the twenty-three thousand retail stores in Chicago, 25 per cent are grocery stores, of which only 9 per cent have proper lighting. Forgetting the lighting engineer's view of this inadequacy, and approaching it from the customer's interest, is 5 foot-candles enough? It certainly is not even enough for an outlying grocery that closes at 6 p.m. five nights in the week. On the sixth, Saturday night, the light will draw new customers. We don't even need to mention the stormy winter nights, when it becomes dark about 5 p.m. Then, why do we find so many grocery stores with less than 5 foot-candles? It is evident that the real truth has not yet been presented to the grocery merchant in such a way as to cause him to think and reason along the right lines.

Although drug stores are better lighted than any of the others classified, yet but 30 per cent of them have an intensity over 5 foot-candles. The druggist has a better idea of what good lighting means than the average store owner. The drug store is a long-hour user of electricity and for that reason has a better opportunity to judge the results obtained by improved lighting.

The survey shows that only 25 per cent of the retail stores of Chicago

*From a paper presented before the second annual meeting of the Great Lakes Division of the N. E. L. A. at French Lick Springs, Ind., Sept. 28-30.
†Head lighting agent.
‡Illuminating engineer.

have an intensity of 5 foot-candles or better, and only 2 per cent have intensities of 10 foot-candles, as shown in Fig. 1. It is indeed regrettable to think that only 2 per cent of the retail stores may be classed as progressive and meet the present-day standards of good lighting. This means that seven out of ten stores are prospective customers for better lighting. We do not mean by a "prospect" one that is "sold" on the value of better lighting, but rather a prospect is considered as one who has such poor light that his customers, he himself and all with whom he comes in contact would be benefited by its improvement. The enormous field is furnished by the six out of seven prospects that can be won by patience and tactful selling.

The 1921 survey also showed that the stores had an average of 8.4 fixtures. It is a very conservative estimate to assume that one-half of the present equipment is in reasonably good condition. Granting this, 108,560 bare lamps, drop cords and obsolete fixtures should be replaced by modern fixtures.

Nearly one-half of all the stores—41 per cent, to be exact—are using the latest-type high-intensity "C" lamps, while few of them have proper fixtures.

Many good lighting installations are rendered inadequate and inefficient because of the accumulation of dirt. Few merchants realize that from 35 to 40 per cent of the illumination is absorbed by the accumulation of dust on the fixtures. Dirt and dust collect in a comparatively short time. To meet this situation it is necessary for the central station to maintain a cleaning service, as the average business man is so busy thinking of his own line of work that he usually neglects the lighting system. Fixtures should be taken care of at least every thirty days.

THE SECOND SURVEY

Following the first survey, an intensive store-lighting campaign was conducted, and in the early part of 1922 a new survey was made of the stores that were included in the former survey. As the former survey gave us a very definite check on the re-survey, it was comparatively easy to ascertain just what had been accomplished by our store-lighting campaign.

The lighting salesman was told that we expected him to work for installations of at least 10 foot-candles. How well he succeeded is evident from a study of Chart No. 1. Of the ten classifications surveyed all but three equaled or exceeded 10 foot-candles, with a minimum of 7.1 foot-candles, a maximum of 14 foot-candles and an average of 10.1 foot-candles.

This latter survey revealed a startling thing, viz., that it was not the poorly lighted store that was relighted, but rather the store which already had intensities well above the average as shown in chart No. 1. In other words, the merchant who had been using good lighting had a real appreciation of its value to his business and was only too willing to better his installation.

It is interesting to analyze what it would mean if all of the store owners in Chicago realized what good lighting means. If the stores that have an intensity of less than 5 foot-candles would bring their intensities up to that standard there would be an increase of 31,747 kw. in lighting load and an increase in revenue of $99,350 per month, or an annual increase of $1,192,220, would be brought to the Commonwealth Edison Company.

The lighting salesman devoted most of his time to the merchant whose lighting was poor. His usual answer was, "Business is no good." This is the man that is difficult of conviction.

Often aggressive merchants come into the Edison Building and ask what is new in lighting or how they can improve their lighting. These are the merchants that have good lighting and want better lighting. This proves that the commercial lighting business does not follow the "line of hope," but instead varies approximately as the square of the "line of hope" toward saturation, and we are far from saturation.

What do these data obtained from the second survey point out to the central-station company? Just this: That the increased revenue ranged from a minimum of 26 per cent in restaurants up to a maximum of 94 per cent in dry goods stores, or an average increase of store-lighting income of 45.7 per cent from stores that already had fairly good lighting. (See chart No. 2.) There is nothing spectacular about thoroughness, but if store-lighting intensities approached thoroughness — approximately 10 foot-candles—the lighting income of this central station would be more than $2,500,000 per year.

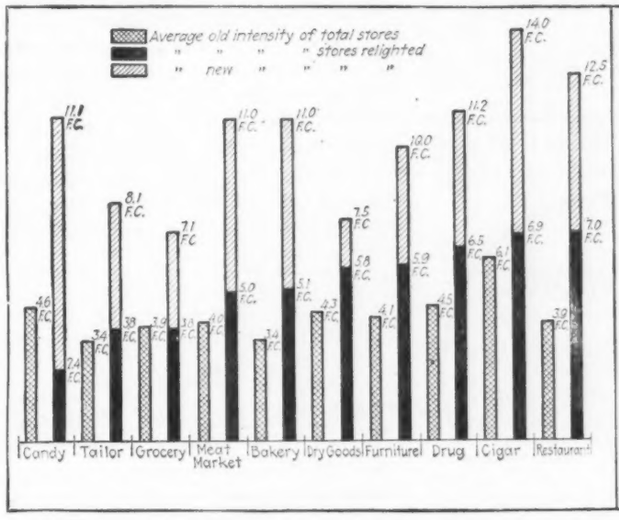


CHART 1—COMPARISON OF INTENSITIES BEFORE AND AFTER STORES WERE RELIGHTED

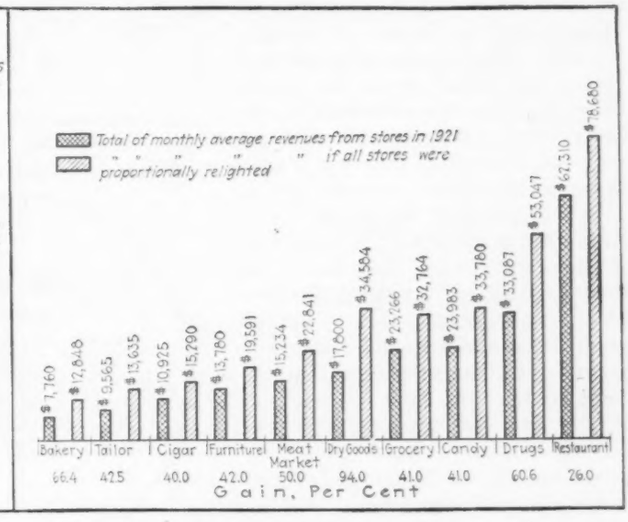


CHART 2—SHOWING INCREASE IN REVENUE IF ALL STORES WERE PROPERLY LIGHTED

Must Eradicate Idea That Utilities are Soulless

THE idea that public utility companies are soulless corporations must be eradicated from the public mind if public relations are to be improved, declared H. W. Bell, director of service, Utica Savings Bank, before the convention of the Empire State Gas & Electric Association at Lake Placid, N. Y. The public must be imbued with the fact that utilities are created for service, that they have honest aspirations the same as individuals, and that their interests and the public's are mutual.

Too many corporations have cold exteriors and colder interiors, the speaker went on to say. Frequently the officials are inaccessible and hold themselves aloof from the public. This condition can be corrected by establishing a department which will serve as a personal, intimate contact between the public and the utility.

Indicating what can be done with such a department, Mr. Bell referred to the experiences of the Utica Savings Bank, which hired a man to find out the reason for its lack of cordial relations with the public. He reported to the president that the fault lay with the bank. After hearing the facts the president addressed an open letter to the public announcing that he had found a most surprising and regrettable condition and that he intended to establish a department which would represent the public and which would apprise him of conditions that should not exist. This department has the privilege of telling the president of the bank when things are wrong. What is more, he listens and corrects the trouble.

The purpose of the department is to arouse such a social conscience in the bank officials and the employees that they cannot exist unto themselves alone.

All of the activities of this department are not directly connected with banking practice. Still, they redound to the profit of the bank. For example, there is a home economics bureau. In addition, the director of the service department speaks before clubs and schools and elsewhere on economic problems.

As a result of this department's activities there has been an increase in warmth and cordiality. Mr. Bell did not contend that such a department can operate effectively without proper publicity; the two things must be carried on together.

Public utility companies which are sincerely interested in improving public relations can obtain like results, Mr. Bell asserted. The man in charge of the department must be carefully chosen and of broad caliber. He must represent the public rather than the company. Furthermore, he must have access to all officers of the company, the privilege of taking up complaints with the executives and the right to demand quality and quantity of service from every employee.

Tying in a New Station with Industrial Opportunities

SINCE the recent establishment of service from the new South Meadow generating plant of the Hartford (Conn.) Electric Light Company, the latter has been carrying a weekly advertising message in the local press emphasizing the value of power service to various industries in the territory and the mutual interest of manufacturers and the public in the provision of these increased facilities. One of these advertisements, reproduced herewith, points out the benefits the great manufacturing plants of the city are rendering to the community and shows how the central-station company and these power-using establishments working together are performing a real service in their respective fields. Other displays feature opportunities in particular industries for the use of central-station service or emphasize installations already completed in these fields.

THE HARTFORD ELECTRIC LIGHT COMPANY
TEL. 2-0131 200 PEARL ST
TEAM WORK
The Factories and the Power Company
We are all proud of Hartford's great manufacturing plants. These great establishments employing thousands of workers and sending their products to all parts of the world, are responsible for a large part of the growth and prosperity of our city.
The Factories of Hartford and vicinity use thousands of electric motors to operate their equipment. They use electric heat for finishing and treating their product. They are constantly finding new and useful ways of using electricity in their processes.
Each in their own field, the Factories and the Power Company are working together to provide the articles which people everywhere need, and to bring prosperity to Hartford.
OUR NEW SOUTH MEADOW STATION NOW IN OPERATION

ADVERTISEMENT TELLS VALUE OF POWER SERVICE TO THE COMMUNITY

Narragansett Lighting Rates Reduced

THE Narragansett Electric Lighting Company, Providence, R. I., recently established a new lighting rate with the object of promoting increased use of electricity through the combination of a service charge and an energy charge. Under the provisions of the new rate the former clause, which specified that no bills should net less than 9 cents per kilowatt-hour, is eliminated, so that the rate now consists of a service charge of 50 cents per month per customer and a charge of 7 cents per kilowatt-hour for all electricity used. The energy charge is based upon a fuel cost of $8 per gross ton and is subject to increase or decrease at the rate of 1 mill per dollar variation above or below such cost. Under the provisions of this clause electricity used during September was billed at the rate of 6.9 cents per kilowatt-hour plus the service charge of 50 cents per month.

What Other Companies Are Doing

Louisville, Ky.—The Kentucky Utilities Company recently closed a contract with a local coal-mining company to supply electric power for five mining operations. Under this contract the customer is to advance $30,000 to cover the cost of the line extension and guarantees a minimum power bill of $20,000 per annum.

Oklahoma.—By a combined vote of 230 to 4, the towns of Boswell and Soper have voted to sell their municipal distribution systems to the Oklahoma Power Company. In these two communities are nearly 400 electric customers who have had only five-hour service from the municipal plants and will now receive twenty-four-hour service from the company's transmission system.

Chicago.—Electrical energy output at the operated properties of the Standard Gas & Electric Company for the week ended Sept. 16 increased 14.5 per cent over the corresponding week of 1921. Applications were received for 2,566 new electric services, covering 1,265 kw. of lighting and 1,289 hp. in motors. Electric connected load reports show a net gain of 906 customers, with 749 kw. of lighting and 743 hp. in motors.

Digest of Electrical Literature

Including Brief Abstracts of and References to
Important Articles Appearing in the Scientific and Engineering Press
from All Parts of the World

Hydro-Electric Development and Steam Equipment

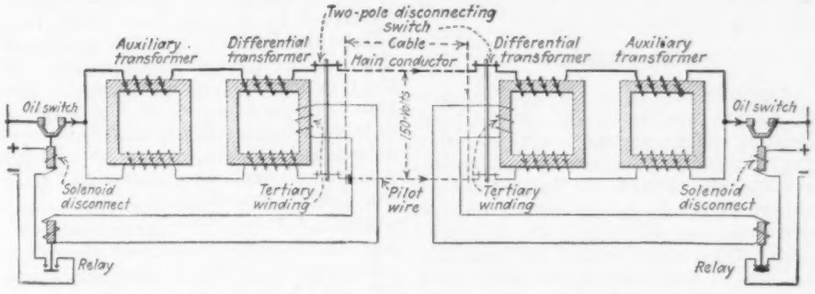
Heat Balances of Blast Furnace and Steel Plants.—W. TRINKS.—Interesting charts showing heat balances for an uneconomical steel plant, an average steel plant, an economical steam-operated steel plant and an ideally operated steel plant are given. Methods of applying the charts to actual conditions are explained.—*Blast Furnace and Steel Plant*, September, 1922.

Systems of Ash Discharge as Applied to Underfeed Stoker Practice.—D. C. SPENCER.—Where widely fluctuating loads are encountered in boiler operation the power dump for ash disposal gives the operator absolute control over the fire, and he may increase the rate of coal to meet almost any contingency that may arise. In case of a fairly constant load in the boiler there is little need for provision to clean fires instantaneously. Clean fires at all times are of utmost importance, however, and to maintain them the discharging of ash as rapidly as it is formed is the best method. The rotary ash discharge system accomplishes this and provides a space in which combustibles may be consumed very completely. It continuously crushes and discharges ash and insures constant furnace conditions.—*The Central Station*, September, 1922.

Present-Day Construction of Electrical Machinery.—L. FLEISCHMANN.—A review of the progress made in design and construction, with a discussion of the main problems encountered. The two chief problems in waterwheels and turbo-generators are the dissipation of the heat from relatively small surfaces and the rotor construction to withstand the great centrifugal forces. The discussion covers rotor construction, improvements in stator design, precaution with deep slots, parallel operation and the heating problem. Other types of apparatus discussed are induction motors, variable-speed alternating-current motors, rotary converters, direct-current motors, mercury rectifiers, transformers and induction regulators.—*Electrician*, Sept. 1, 1922.

Generation, Control and Switching

Cable Protection System.—W. ESTORFF.—A selective cable protection system is described which quickly disconnects a punctured cable from the rest of the system. It is applicable to all interconnected cable networks, and the author claims that it does not react upon overloads. A special cable is required with a central pilot wire which is insulated from the other strands of the cable. At both ends the main and the pilot wires are connected to a small differential transformer, as shown in the accompanying illustration, with such a number of turns as to compensate fully the magnetic fluxes in its iron core if the cable is without a fault. In a tertiary winding upon the core of these transformers no voltage will be induced under normal conditions. This third winding governs the relays, which in turn actuate the oil switches at both ends of the cable. In case of a puncture between the phases of the cable, the previous magnetic balance will be disturbed, a current will be induced in the tertiary winding, and the oil switches will instantly disconnect the disabled cable. To be safeguarded against the rare case of a metallic connection between the main strands of the cable and the pilot wire, an additional small transformer is provided for at both ends. This maintains a constant voltage of about 150 between the main and the pilot wire. If the pilot becomes connected to the main strands, this voltage flows through the differential transformers, disturbs their equilibrium and causes the disconnection of the cable. The actual construction of the apparatus, the cable and the junction boxes used is shown in a number of photographs.—*Elektrotechnische Zeitschrift*, Aug. 11, 1922.



CABLE PROTECTION SYSTEM APPLICABLE TO ALL INTERCONNECTED NETWORKS

Sheet-Steel Cubicles and Truck-Type Switching Equipment in Steel Mills.—G. P. WILSON.—There is no greater field of application for the sheet-steel cubicle, truck-type switchboard and truck-mounted oil circuit breaker than in the steel industry. Their application results in a great saving of labor cost due to the "safety-first" feature, which permits the employment of unskilled labor, improves operating conditions and betters general conditions in any mill by providing a very reliable installation. The author discusses the non-interlocked and interlocked cubicle, outdoor type of sheet-steel cubicle and various kinds of truck-type switchboards.—*Electric Journal*, September, 1922.

Transmission, Substations and Distribution

Possibilities of the Transmission of Large Energies.—J. OSSANNA.—This paper contains a very complete analysis of the advantages and disadvantages of energy transmission with alternating currents of low and standard frequencies and with direct current of high potential. The increased voltage drop due to the inductance of transmission lines may be avoided by the proper use of reactors and rotary condensers. No advantage may be expected from a low-frequency (16⅔-cycle) system or even from a direct-current transmission. A great number of examples have been calculated, and the results tabulated or shown in graphs and curves, to show the different operating conditions of transmission lines if operated by 50 cycles or 16⅔ cycles, or by direct current. In general, a 50-cycle, three-phase system, with as heavy and as few conductors as possible, will result in the most economical and most efficient transmission.—*Elektrotechnische Zeitschrift*, Aug. 11 and 17, 1922.

Present State of Power Transmission.—M. SHIBUZAWA.—The author reviews the progress that has been made in high-tension transmission as observed during his travels through Europe and North America. In Europe the Petersen coil is used for protection and any sort of lightning arrester is regarded of but little value. In regard to oil switches in North America, the double breaker without resistance is generally used, while in Europe the multiple breaker with resistance is popular. Insulator and high-tension underground cable practice is reviewed.—*Journal of the Institute of Electrical Engineers of Japan*, August, 1922.

Units, Measurements and Instruments

Use of Spectrophotometric Data.—F. A. BENFORD.—With the development of new types of aluminum and accessories for modifying light, it is necessary to analyze the light by means of the spectrophotometer if accurate comparisons are desired. This device breaks up the light into its component parts and measures the intensity of each individual part. Various methods of plotting the results have been employed. These are analyzed with a dis-

cussion of the limits which should be applied to such tests, the boundary which should be assigned to various spectral colors and the choice of wave length units.—*I. E. S. paper, Swampscott, Mass.*, Sept. 25-28, 1922.

Ignition Temperature of Coal.—RAY W. ARMS.—In connection with the storing of coal in piles the ignition temperature takes on a real significance. Coal is actually burning at all times and even at low temperatures. If the heat thus produced is sufficiently confined and air is supplied to the coal at the proper rate, the temperature of the mass will rise. A study is made of this problem with the object of determining the influence of the temperature of ignition of the various coals upon the liability to fire while in storage. A discussion is given of what point may actually be designated as the ignition temperature and what factors influence that point, the methods for determining the ignition temperature of different coals and the results of tests upon the various coals used in the investigation. —*Bulletin* 128, *Engineering Experiment Station, University of Illinois.*

Illumination

Lighting of Public Eating Places.—J. L. STAIR.—Practically no field of lighting offers as many opportunities for originality and special effects as the restaurant. Owing to the variety of eating places it is apparent that the demands for lighting are different. These requirements are very skillfully handled in the paper under notice. The author points out that neatness combined with efficiency demands primary consideration in a commercial or industrial cafeteria. There is an extremely wide latitude in the treatment of the more decorative types of lighting. The paper is illustrated by a large number of photographs, showing installations that have proved successful in service from the standpoint of comfort.—*I. E. S. paper, Swampscott, Mass.*, Sept. 25-28, 1922.

Lighting of the Milwaukee Art Institute.—H. W. BOGNER and A. J. SWEET. —The paper is a study of the lighting problem of the Milwaukee Art Institute, and the solution presented by the authors is an interesting treatment of the various phases of lighting as encountered in a building of this type. Illustrations of various rooms, floor plans and types of lighting units are shown.—*Transactions of the I. E. S.*, September, 1922.

Motors and Control

Control Apparatus for Rolling-Mill Motors.—W. R. WICKERHAM.—The correct design of control apparatus for alternating-current rolling-mill motors cannot be undertaken without a knowledge of the power-plant conditions and the type of transmission line which will be used to supply power to the equipment. The variable factors in their relation to the parts of the control apparatus are covered by the author. These factors include the power plant kva., voltage and frequency, power-plant equivalent impedance characteristics, synchronous machinery on system, transmission-line characteristics, method of operating primary control, meter combinations, electrical characteristics of motor secondary, accelerating torques and bare motor or flywheel combination drive.—*Electrical Journal*, September, 1922.

Considerations in Laying Out Motor Circuits.—MARIN PHILLIPS.—The author shows how to lay out and make a motor installation that is safe and reliable and explains the construction of a motor panelboard. Tables for sizes of wires, switches, fuses and conduits are given.—*Power*, Aug. 29, 1922.

Additional Copper Losses in Electric Machines.—H. RICKLI.—Based upon work of Rogowski in the "Archiv für Elektrotechnik," 1913, third issue, the author develops a number of formulas for the simple calculation of additional losses in windings of electrical machines, especially for generators, motors and transformers. It is shown how the height of the copper or aluminum rod, embedded in an open or closed slot, affects the losses and how to arrive at the most advantageous dimensions for the conductors. The new formulas are tested in accordance with the winding data and losses of actually built machines and show a very close appoximation.—*Bulletin of Association Suisse des Electriciens*, August, 1922.

Size of Fuses for Motors.—L. W. GOING.—A method is devised for determining the size of fuse necessary for a group of induction motors. Special reference is made to those cases where large motors are included in the group the starting current of which really determines the size of fuse needed for the group. Curves are included that can be used for a wide range of factory work in wiring motors. These will save time in making calculations or referring to other wiring tables.—*Industrial Engineer*, September, 1922.

Heat Applications and Material Handling

Use of Electric Heat in the Railroad Shop.—E. F. COLLINS.—A brief outline of some of the possibilities of electric heating appliances in the railroad shop is given with the intent to induce engineers to investigate the economic advantages of electric heating as compared with those afforded by fuel-heated apparatus. Among the various applications of electric heat described are sherardizing, core-baking ovens, shrinking furnaces, japanning ovens, heat-treating furnaces, rivet heaters, etc.—*Railway Electrical Engineer*, August, 1922.

Design of Steel Coal Bins.—R. FLEMING.—The principal type of structure concerned is the overhead bin or bunker for the boiler room of a power house. After reviewing the present practice in this regard, the author considers weight and friction angle, hopper bottoms, plate thickness and lining, pressure calculations and bending moments. Too much attention cannot be given the importance of proper detailing for obtaining good work.—*Engineering News-Record*, Aug. 31, 1922.

Electrophysics, Electrochemistry and Batteries

Electrical Characteristics of Dry Cells.—G. W. VINAL and L. M. RITCHIE. —Two articles taken from the forthcoming Circular 79 of the Bureau of Standards of "Electrical Characteristics and Testing of Dry Cells." The first gives the effect of temperature on voltage, amperage, shelf life, and tests of cells. Tables and curves of discharge at constant resistance and constant current show capacities to different end points at different rates. The second article explains the behavior of a dry cell in a circuit and the effect of internal resistance, illustrated with equations and curves. Grouping the cells is also discussed.—*Chemical and Metallurgical Engineering*, Sept. 13 and 20, 1922.

Dezincification of Brass.—R. B. ABRAMS.—Experiments are recorded the results of which indicate that the mechanism of dezincification involves the dissolving of the brass as a whole, the copper in solution being redeposited, replacing brass as a unit. This redeposition does not take place unless there is something holding the dissolved copper in contact with the brass, which may be accomplished by the presence either of a membrane or of a large excess of dissolved copper.—*American Electrochemical Society paper, Montreal*, Sept. 21, 1922.

Traction

Electrification of Railroads with High-Frequency Alternating Currents. —MAURICE LEBLANC.—This paper describes the possibilities of a system of railroad electrification using 20,000-cycle, single-phase current. The most unusual feature of this system is the lack of any metallic connection between the overhead power supply and the train. Instead of an overhead trolley wire, a specially built-up condenser is used consisting of partly telescoped copper tubes of smaller and larger diameters which are slid half way into each other, the interstice being filled out with a dielectric of good insulating properties. Two such "overhead condensers," building a loop, are laid out above the track and are energized by single-phase, 5,542-volt, 20,000-cycle alternating current. Along the roofs of the cars on the track is carried a wire loop, placed about 3 ft. under the "overhead condenser." In this loop an alternating current, likewise of 20,000-cycles frequency, will be induced. The author shows how by means of a special arrangement containing a set of electron tubes, two triple-winding transformers and a motor-driven commutator the high-frequency current can be transformed into low-frequency and low-voltage three-phase current.—*Revue Générale de l'Electricité*, Aug. 26, 1922.

New Books

Reviews of the Latest Contributions to
Technical, Industrial and Commercial Literature of Particular Interest
to Members of the Electrical Industry

Standard Handbook for Electrical Engineers

By Frank F. Fowle, editor-in-chief. Fifth edition, revised. New York: McGraw-Hill Book Company, Inc. 2,137 pages, illustrated.

The reputation of the Standard Handbook for accuracy and thoroughness is well maintained in this new edition. The production of a revised edition of such a handbook is a tremendous task, and Mr. Fowle and his corps of editors are to be congratulated on their production. Nearly every section has been completely revised and new names appear on the list of contributors. At the same time, the former editorial staff was able to profit by the comments of the users of the book and to revise previous contributions to insure their being in the most convenient form. More than fifty names appear on the editorial list—a group assembled from the factory, college and utility company who are recognized authorities in their respective fields. To the section entitled "Industrial Motor Applications" material was contributed by twenty-three specialists.

The book has twenty-five sections, each of which contains up-to-date data, well grouped in charts or curves, together with a real discussion of the technical and operating features of the subject. A large number of bibliographies add materially to the value of the new edition.

Every electrical engineer can use the Standard Handbook with profit and read it with pleasure, for it is filled with interesting material from cover to cover. One of the greatest improvements in the new edition from the standpoint of the user is the new index. The value of a handbook is greatly enhanced by a good index, and that furnished with the book just issued is excellent. L. W. W. MORROW.

Modern Methods of Welding as Applied to Workshop Practices

By J. H. Davies. 263 pages, illustrated. New York: D. Van Nostrand Company.

This is a rather complete book in that the subjects treated cover a wide variety of practice and much attention is given to apparatus of various kinds. Chapters on pre-heating, on the preparation of welds, on handling cast iron, aluminum, brass and other metals, including lead burning, are included. Various kinds of welding are described, such as oxy-acetylene, oxy-hydrogen, thermit and electric welding of the different types. Spot welding, butt welding and other methods are discussed in considerable detail. The illustrations are very complete and aid appreciably in clarifying the text. Examples are given of welding in inaccessible places by the use of mirrors. Attention is also paid to the protection of the welder by the use of shields and suitable goggles. While this book is by an English author and naturally gives much attention to British practice, it also devotes considerable space to American methods and American apparatus. The combination should be of value to all users of welding apparatus.

FRED COLVIN.

Principles of Alternating Currents

By Ralph R. Lawrence. New York: McGraw-Hill Book Company, Inc. 432 pages, 121 illustrations.

This book presents the subject of alternating currents entirely from the analytical standpoint. Little attempt is made to give the student a physical picture of what is going on in the circuit. The book is very comprehensive and goes into great detail in regard to certain phenomena met with in alternating-current circuits. It should be added, however, that there is apparently nothing superfluous contained in it. The practical engineer concerned with alternating-current circuits will doubtless have occasion at times to use all the material presented.

On first opening the book the practical engineer, as well as the teacher, is favorably impressed by the fact that the notation used throughout the text is clearly indicated. As a textbook the material and the method of presentation are better suited for students who already have a considerable knowledge of the subject than for beginners. In the opinion of the writer, the book should be preceded by a simpler text. Even then it would be necessary in the average course given to college seniors to omit considerable of the material presented.

The section on the power factor of unbalanced polyphase circuits is very well presented. This is a matter that is usually either touched upon lightly or entirely omitted. The two-wattmeter method of measuring three-phase power, always a stumbling block to the student, is well explained. One is also favorably impressed by the thorough treatment of non-sinusoidal alternating-current waves and harmonics in polyphase circuits. More space might well be given to a discussion of the method of superposition. This method is used throughout the text and is, of course, a powerful means of attack. Some discussion of its justification and the conditions under which it can or cannot be used might well be included in all our textbooks.

This book should prove an excellent text for advanced students if the matter is presented by a skillful teacher. It should also make an excellent reference book for those who have to deal practically with alternating-current phenomena. BENJ. F. BAILEY.

Invention

By Rear Admiral Bradley A. Fiske, LL.D. New York: E. P. Dutton & Company. 356 pages.

While he holds that beyond any question inventions have increased prosperity and wellbeing, the brilliant author of this pregnant study of human achievement in the mechanic and other arts will not undertake to say that they add to human happiness. Yet, since civilization is by the common agreement of mankind a happier state than savagery, "there seems no escape from the conclusion that it is to invention mainly that we must look for increase of happiness in the future." Offsetting this, we have the recent gloomy pronouncement of Guglielmo Ferrero that we have become the slaves of our own tyrant inventions and that it is the great duty of this epoch not to multiply them blindly any longer. And as if that lugubrious injunction were not enough, other authorities warn us that inventions are making arms and legs useless. Human bodies are but bundles of atrophied organs, and in say ten thousand years man will lack both his prehensile and his locomotive appliances, supplanted by those of mere iron and steel. So there you are! Meantime, it is sure that the creative inventive faculty itself will not be atrophied. Admiral Fiske's clever historical survey gives an excellent idea of the process in which humanity is enveloped and by which it is committed to rise on the stepping stones of its old less refined self to higher, better things.

One cannot find fault with this useful compendium and analysis of scientific and mechanical uplift and onlook. Himself no mean electrical engineer and inventor, the good sailor does generous justice to his coworkers in the electrical field and all their gifts to mankind, and little in any field seems to have escaped his observation or scrutiny. But why, that being so, is he negligent of water power and wind power? Perhaps he is of the opinion that in neither of these most ancient utilizations of nature's forces lies real invention. Still, he does mention the hydraulic dredge and jack—why not the vastly more important turbine, or even its humble predecessor, the plain waterwheel? T. C. MARTIN.

Books Received

Machines Electriques. By A. Mauduit. Paris: Dunod. 1,180 pages, illustrated.

Trade Mark Laws of the World. By John H. Ruege and W. B. Graham. New York: Trade Mark Law Publishing Company. 1,002 pages.

Elementary Determinants for Electrical Engineers. By H. P. Few, New York: D. Van Nostrand Company, 95 pages, illustrated.

Six-Place Tables. New York: McGraw-Hill Book Company, Inc. 124 pages.

Letters of a Radio Engineer to His Son. By John Mills. New York: Harcourt, Brace & Company. 261 pages, illustrated.

News of the Industry

Chronicle of Important Events and General Activities, Announcements and Reports of Association Meetings, Court Decisions and Commission Rulings and News of Electrical Men

Investment Bankers Meet

W. E. Creed Tells of the Power Industry in California—Water and Power Act Is Condemned

MEETING at Del Monte, Cal., this week, the Investment Bankers' Association of America discussed the public utility situation in various aspects. Provision for lean years, "junior" financing under proper conditions and customer ownership of securities were favored by prominent speakers. The California water and power act was strongly condemned.

Wiggington E. Creed, president of the Pacific Gas & Electric Company, in his address on Wednesday said in part:

"It will interest you to know that the investment in the power industry in America today has grown to fabulous proportions. In the State of California alone there is invested in this type of security nearly $600,000,000, and the program of construction to meet the needs of this state requires the expenditure of an additional $600,000,000 to $800,000,000 within the next ten-year period. Not only does the power industry stand out from others in the amount of money invested, but it is deeply interwoven with every phase of our national economic development. To handle the properties represented by the great investment in California above alluded to there are 21,000 employees receiving annual pay of $31,000,000, and this industry is paying a little more than $7,000,000 a year in state taxes, in addition to those imposed by counties, cities and the federal government.

"The demands of the industry for capital are being met not only willingly but in a competitive way. In other words, the record of the power industry is such that its securities are eagerly sought for by investment bankers the country over. Of course, the only reason the investment banker seeks securities of this type is because he knows that the big investment markets in Boston, Pittsburgh, Chicago and New York will readily take them because wise investors want them."

Pittsfield Laboratory Now Produces 1,500,000 Volts

Further advances in the generation of extremely high electric potentials have been announced by the high-voltage engineering laboratory of the Pittsfield works of the General Electric Company. Several combinations of voltages have been obtained and studied for the first time, the highest being 1,500,000 volts, which is half again as much as that recorded in this laboratory a year ago. In this combination one terminal with 1,000,000 volts was connected above ground and the other with 500,000 volts below ground.

One million two hundred and fifty thousand volts, single-phase, was also produced, as was 1,000,000 volts, three-phase, with neutral grounded. A million and a half volts arced between needle points 14 ft. apart. One million volts, three-phase, formed a blazing triangle, 9 ft. on a side, between needle points.

Such advances, the Pittsfield laboratory said, are not only of importance in electrical research and the design of apparatus for the more economical transmission of electric power over long distances, but also open up new fields of research for the physicist, astronomer and physician.

Direct Current at 1,500 Volts for Illinois Central

Adoption of a 1,500-volt direct-current system with overhead contact has been recommended for the electrification of the Illinois Central Railroad by the railroad's engineering commission, composed of eminent heavy-traction electrification engineers. The commission discarded three possible systems, namely, three-phase, alternating-current; storage-battery locomotive and Diesel engine locomotive, as out of the question. This left four systems for final consideration—750 volts, direct current, with third-rail; 1,500 volts, direct current, with overhead contact; 3,000 volts, direct current, with overhead contact, and 11,000 volts, alternating current, single-phase, with overhead contact.

Estimates on first cost, maintenance and operation were made covering all of these systems. Although the 750-volt system did not differ materially in first and operating cost from the other systems, it was eliminated because it required too large a network of third rails and because of climatic conditions. Of the three systems using an overhead contact, the 1,500-volt system was thought best for the particular problem involved—a heavy suburban passenger service, freight transfer switching in congested yards and eventually through passenger movements. It is said to be quite different from any electrification now in operation either in Europe or America.

Executive Optimism Shown

Outlook of Edison Association Roseate —Alternating Current Grows in Favor—New Edisonia

THAT a spirit of optimism pervades the larger electric light and power companies of the country was evidenced at the convention of the Association of Edison Illuminating Companies held at White Sulphur Springs, W. Va., on Tuesday, Wednesday, Thursday and Friday of this week. This tone was reflected in the address of the president and in most of the committee reports. The construction of hydro-electric and steam stations with their attendant transmission and distribution systems is proceeding on a scale hitherto unknown in the industry. Attention was called to the readiness with which funds can be obtained for new enterprises and to the preparations being made by the engineering and operating staffs for handling greatly increased loads more economically and efficiently.

Alternating current is being considered seriously for use in future extensions of Edison systems owing to the greater expense involved in direct-current substation distribution as loads increase in density. W. C. L. Eglin of Philadelphia recommended that four-wire, three-phase distribution, star-connected, be the method adopted for use in all parts of the system, including generation, transmission, primary distribution and secondary distribution, both in densely loaded business districts and in residence districts, and that all new business be connected to this system. He suggested also that wherever practicable existing business be transferred to this system, in that way fulfilling the fundamental principle enunciated by Edison of a single distribution system in which all of the advantages of diversity factor may be obtained.

Address of President Sloan

The president, M. S. Sloan, in his address dwelt on the economic condition of the country and the degree to which electric utilization affects it, the coal strike and the necessity of greater water-power development and wider interconnection of electric generating systems in the interests of a cheaper, dependable and more abundant power supply.

The desirability of a wider market for public utility securities was emphasized by making the bonds of utilities legal investment for savings banks and through the sale of securities to cus-

tomers. Touching the latter President Sloan sounded a note of warning. He said: "If the members of our industry decide to use this method and source for funds, the industry must be very careful to see that only safe and profitable issues are offered to the public. The bad effect on the public of a flood of weak and unprofitable stocks is too obvious to state, and it would be well if we took the first step and organized a board of investigation among ourselves to examine carefully and review proposed issues for many reasons—principally to prevent poor ones being offered, but also to co-ordinate them to market conditions, to prevent excessive offerings, to forecast favorable and unfavorable periods and in every way to preserve our market in the best condition."

Reference was made to the recent Supreme Court decision in the New York Consolidated Gas case, and particularly to the pertinent statement of the court that "when it became clear that the prescribed rate had yielded no fair return for more than a year, and that this condition would most certainly continue for many months, the company was clearly entitled to relief." This pronouncement of the highest court of the land, President Sloan maintained, was most reassuring, relieving companies of the danger of greatly prolonged periods of unfair returns and enabling them to get on with smaller reserves, which more closely represent the funds required for renewals, replacements and contingencies.

While the courts had thus clearly defined the issue, it was pointed out that threatened measures like the Bacharach bill would only act as stumbling blocks to impede and delay final judgment, very often to the detriment of the public utility.

AN EARLY EDISON DISCOVERY

Before the advent of the telephone and a dozen years before the classic work of Hertz with electrical waves Thomas A. Edison, according to notes unearthed by E. W. Hammer, discovered some puzzling phenomena while experimenting with an electromagnetic vibrator. Edison could not explain them, Mr. Hammer said in his paper, by any known theory of the electric circuit, the consequence being that he considered them the manifestation of a new force. He found that the strange influence could be detected at a distance through the use of loop receiving circuits of various kinds containing capacitance, inductance and an imperfect contact receiver. Without having available the theoretical equipment possessed by Hertz in 1886-1888, Mr. Edison had the same fundamental basis for wireless in 1875, according to the author, which Hertz subsequently established. Etheric force was the prophetic name for those ether waves now so widely employed.

That the advocates of direct-current low-tension distribution are constantly on the alert to perfect the system was shown in a paper by C. W. Wilder and C. H. Shaw of New York. By the method of equalizing feeder loads the New York Edison Company has succeeded in increasing the possible maximum loading of its feeders about 10 per cent. This has resulted in a number of the substations being able to operate on two buses instead of three, thereby enabling the stations to utilize more fully the available capacity of the rotary converters. In addition, two stations are now under construction which will have two buses instead of three, thus eliminating the cost of one bus and the necessary switches with their attendant complications. Distribution efficiency has also been increased owing to the more uniform current density on the feeders.

One of the most interesting reports of the convention was that of the committee on steam turbines and generators, which treated of several important advances in the art of steam-turbine design and of the evolution of auxiliary systems and heat balance in power plants. The important report of the lamp committee was delivered as usual by John W. Lieb.

Detroit Preparing to Build Municipal Plant

Plans and specifications for an electric power plant which will provide for all municipal requirements, such as lighting public buildings and streets, waterworks and sewage pumping stations and energy for the street-railway system, are being prepared under instructions from the Public Lighting Commission of Detroit. The plant is to be designed for an ultimate rating of 150,000 kva., and four units of 25,000 kva. each are to be installed in the immediate future. A 17-acre site in the southwestern part of the city has been selected. A complete transmission system will be installed.

New York Electrical Show Attracts Thousands

Opening last Saturday and continuing all through this week, the Electrical and Industrial Exposition attracted many thousands of citizens as well as those specially interested in electricity and its adaptations to the Grand Central Palace in New York City. The Museum of Edisonia was one of the features that drew the greatest crowds. The model electrified home exhibited by the United Electric Light & Power Company and the transferable luminaires, which can be moved from room to room or from house to house, were also objects of keen interest. Among some of the notable exhibits in the booths were new types of automatic lifts for handling materials in warehouses, woodworking apparatus, soda-bottling machinery and water purifiers, soap-manufacturing machinery, an improved telephone switchboard, a model cigar factory run along electrical lines, an automatic machine for the manufacture of screws, one for the control of heat in radiators and another for the manufacture of envelopes.

The parade of electric vehicles on Tuesday morning brought out 125 trucks and delivery vans, despite unfavorable weather.

Civil Engineers' President on Water Power

John R. Freeman, president of the American Society of Civil Engineers, which has just held a water-power convention at San Francisco, speaking last week at the ceremonies held on putting into service the Pit River power plant No. 1 of the Pacific Gas & Electric Company, 15 miles east of Mount Shasta, Cal., said that the cities of Lowell and Lawrence, Mass., in the days when the development of the old direct water power was at its height, had 150 units in operation, requiring three men on a shift for each unit. "The Pit River power plant," continued Mr. Freeman, "contains two units of 35,000 kw. capacity each, and it is interesting to note that one of these units alone will turn out more water power in the form of electricity than all the 150 units which ran the textile mills of Lowell and Lawrence. Not only is there a distinction in quantity of output per unit, but there is another great distinction between water power in the form of electricity and water power in the direct form, and that is that the water power in the form of electricity is portable. It can be removed from the mountain fastnesses, where it is useless, to turn the wheels of industry and be carried down to the valleys and to the cities to supply the needs of man."

Stone & Webster Managers Hold Discussion

A nation-wide "experience meeting" upon public relations and commercial problems was conducted this week at Boston, when about 175 executives of Stone & Webster, Inc., assembled at the home office for a five-day convention of managers of utilities under the administration of that organization. On Monday Edwin S. Webster gave a brief address upon "The General Financial Situation," followed by Peter O. Knight, Tampa, Fla., upon "Everyday Problems of the Utility Manager." and W. Cameron Forbes, former Governor-General of the Philippine Islands.

In place of numerous individual papers, this year's convention confined itself to the presentation and discussion of topical papers prepared by a committee consisting of H. T. Edgar, A. S. Pratt, C. W. Kellogg, C. F. W. Wetterer, M. L. Sperry and H. A. Lemmon. These subjects included "Internal Relations and Welfare," "Our Sales Department," "Simplified Rates," "The Street-Railway Situation," "Complaints," "Important Developments in the Gas Field" and "Local Security Sales." H. H. Hunt presided, and on Wednesday an outing was held at the Belmont Springs Country Club. Managers of thirty-five utilities operated by Stone & Webster, Inc., were present, representing many districts.

Contractors and Dealers Meet in Cincinnati

The twenty-second annual convention of the National Association of Electrical Contractors and Dealers opened at Cincinnati on Wednesday of this week.

"Yesterday, Today and Tomorrow" was the topic of George M. Verity of Middletown, Ohio, on the opening day. W. R. Herstein of Memphis discussed "The Supply Jobber and the Electragist," and Frank E. Watts, editor of the *Electrical Record*, spoke for the Joint Committee for Business Development. A motion picture, a play and a reception and dance diversified the program.

On Thursday the program included discussions of the following papers: "The New Manual of Estimating," by Arthur L. Abbott of St. Paul; "Electrifying America—Getting the Job Done," by F. M. Feiker of the McGraw-Hill Company; "The Manufacturers' Problems," by Gerard Swope, president General Electric Company; "How an Employers' Association Functions," by Edward T. Miller of Chicago, and "Specific Specifications," by E. H. Eardley of Salt Lake City. The annual outing took place in the afternoon.

"How the National Can Improve the Electragist's Business," by Laurence W. Davis, New York; "Benefits of Organization," by W. C. Culkins, Cincinnati; a code discussion led by A. Penn Denton, Kansas City, and followed by a talk on recodification by Dana Pierce, chairman of the National Fire Protection Association's electrical committee; "A Central Station's Wiring Campaign," by W. W. Freeman, Cincinnati; "Selling the Electric Idea to the Ladies," by Miss Alice Carroll, New York, and "Insurance for Electragists," by Lynton T. Block, St. Louis, were the chief items that were scheduled for Friday.

Wisconsin Consolidations May Bring Legislation

Numerous consolidations of Wisconsin power companies which have become operative in the last twelve months may, according to the recently expressed opinion of L. E. Gettle, a member of the State Railroad Commission, bring corrective legislation in the session of 1923.

"There can be little question," he declared, "that there is an ever-growing tendency in Wisconsin toward the consolidation of public utilities, especially those based on power. It is only recently that we have seen the expansion of the Wisconsin-Minnesota Light & Power Company in the northern part of the state, the control of the Milwaukee Northern stock by the Milwaukee Electric Railway & Light Company, the interchangeable mileage book affecting all electric roads in eastern Wisconsin, the merger into the Wisconsin Securities Company of the electric railway, gas and power systems of Green Bay, Oshkosh, Sheboygan, Marinette, Menominee, Mich., Sturgeon Bay, Kewaunee and Algoma, and the present proposal of a supply of electric power to a score of cities in the Baraboo valley. The real basis for this consolidation is the development of water power."

Mr. Gettle contends that the Railroad Commission, organized for the purpose of protecting the consumers, is in reality able to do little in these consolidation and inter-contract cases. "Practically the only way we have of regulation," he says, "is through the approval of stock sales or the issuance of new stock necessary. This is especially true in inter-contracts between companies. Actually we are but protecting the buyer of stocks in some of these companies instead of safeguarding the consumer of the utility's products."

There will, in Mr. Gettle's opinion, be a continuance of the tendency to consolidate that will eventually link the main cities by chain systems. The problem presented is, he says, comparatively a new one for the commission, and the rules and precedents set will have an important place in future regulation of public utilities.

Utility Advertising Men to Complete Organization

No dissent from the proposal to organize a Public Utility Advertising Association which will apply for membership in the National Advertising Commission and the Advertising Clubs of the World was expressed when the report of the committee on organization was presented at the round-table discussion of the public relations and advertising men at the American Electric Railway Association at Chicago on Wednesday of last week. The organization committee, under the chairmanship of W. P. Strandborg of the Portland Railway, Light & Power Company, was appointed at a meeting in Milwaukee on June 13, 1922, at which the light and power, railway, gas and telephone utilities were represented. A tentative draft of the constitution and standards of practice were presented at the Chicago discussion, and the organization committee recommended that a time be set for the next meeting, at which the constitution and standards of practice should be adopted and officers elected, preliminary to applying for membership in the bodies already mentioned.

West Penn Power Company to Make Large Extensions

An extension to the Springdale plant of the West Penn Power Company which will accommodate two new 35,000-kw. turbo-generators is to be undertaken at once, according to a statement authorized by A. M. Lynn, president of the company. Contracts have already been let for the additions to the plant, which will more than double its present capacity of 42,000 kw.

Work also is to start at once on a steel-tower line from Springdale to Charleroi. This will carry two 132,000-volt circuits and at Charleroi will connect with a line from the Windsor plant on the Ohio River. Other improvements and extensions are planned by the company, the total cost of the work now under way and about to be started being put at $15,000,000.

Stringent Electrical Code Adopted in Wisconsin

A new electrical code has just been adopted jointly by the Wisconsin Industrial and Railroad Commissions. Following are a few of its provisions, some of which are of a stringent character.

The wiring of all schools, theaters, halls, hotels, hospitals and service garages must be metal conduit. Circuits in any building carrying more than 300 volts also must be placed in conduit. Entrance wires to all buildings shall be in conduit from the point where the overhead service attaches to the building to the service switch. This conduit must have a condulet where the service wire is attached to the building which is moisture-proof, has a separate outlet for each wire and is so arranged that water cannot run into the conduit. The conduit for entrance wires may, however, be omitted where the service wires can be brought in directly to the back of the cabinet containing the service switch.

An unusual requirement is that the ground wire and grounded neutral in house wiring must have a designated color. Other rules are that each building shall have a separate service and that the entrance switch shall be inclosed in a metal box and be externally operated and sealed or made inaccessible to other than qualified persons.

Philadelphia Safety-Switch Congress on Nov. 4

A safety-switch congress and exhibit has been planned by the Philadelphia Section of the Association of Iron and Steel Electrical Engineers to be held at the Hotel Majestic, Philadelphia, on Saturday, Nov. 4. About twenty-five manufacturers of safety switches for 600-volt service and below, including motor-starting switches of the "across-the-line" type only and limit switches for cranes, will exhibit their products.

The exhibit will open at 1 p.m., and at 6.30 p.m. a dinner will be served. Following the dinner, P. T. Vanderwaart, electrical engineer of the New Jersey Zinc Company, Palmerton, Pa., will read a paper, to be followed by a general discussion by electrical engineers of the iron and steel and other industries, central-station men, jobbers and contractors and representatives from the underwriters' societies. The proper design and application of the safety switch, both as a means for disconnection of power and lighting service and as a means for manually starting squirrel-cage motors which can be directly connected to the line, will be considered.

Managerial Problems Theme at Lake Placid

Empire State Association Discusses Improvement of Public Relations, Rural Service, Simplification of Demand Billing, the Fuel Situation and Other Practical Topics

THE importance of establishing better public relations and methods of accomplishing this end, the necessity of giving rural service before farmers are roused to drastic action in order to obtain it, the benefit of reducing the number of forms of demand billing, and a method of handling the fuel situation were the outstanding subjects discussed before the eighteenth annual convention of the Empire State Gas and Electric Association at Lake Placid, N. Y., last week. In addition, attention was directed to the amount of business available through an "Electrify America" campaign, the possibility of helping small companies in their sales development by lending them power sales engineers, and the advisability of adopting the N. E. L. A. uniform system of accounting. Engineering problems and practices were dealt with in the reports of the electrical and meter committees.

A relatively optimistic view of the prospects of electric service companies was expressed by President E. H. Rosenquest, who declared that the continually increasing revenue of these companies is the best sign of returning business prosperity. Reduced cost of materials and equipment as well as of money has made plant development and extension possible again. Another favorable sign is contained in recent court decisions regarding property valuations, depreciation and service charges. Electricity will be demanded this winter as never before, President Rosenquest asserted, owing to the fuel situation. Referring to the all too frequent misunderstandings between the public and utilities, he contended that the fault resides chiefly in the utilities' failure to give out more information. This failure will be largely overcome by public utility information bureaus.

Analyzing the fuel situation, W. M. Carpenter, assistant secretary of the association, urged utilities to store enough coal to prevent "hand-to-mouth" existence. Service interruption due to lack of coal will not occur, Mr. Carpenter declared, if every company will cooperate by informing the coal-distributing authorities regarding the amount of coal which it has on hand each week.

Importance of Good Public Relations

Establishment of harmonious public relations is one of the most important tasks before public utilities now, in the view of M. S. Sloan, chairman of the New York State Committee on Public Utility Information, who addressed the convention. The problem is to convince the public that the public utility industry is owned by it and operated to serve it. If the facts are made known, the majority of the people will give utilities a fair deal. So far the financial support for this work has not been what it should be, but more than money is needed. Companies must co-operate by giving the best service for the lowest rates and by cultivating the good will of newspaper editors and reporters.

A résumé of what the New York Public Utility Information Committee is trying to do, how it is doing it and the results which have been obtained was presented by F. W. Crone, director of the work.

An analysis of central-station advertising made by W. J. Reagan, chairman of the Commercial Section's sub-committee on advertising, shows that about 60 per cent refers to appliances and 25 per cent to securities and that information fostering good will is almost entirely neglected.

H. W. Bell, director of service for the Utica Savings Bank, told how public relations in that institution had been improved, suggesting that the same methods could be applied by public utility companies.

Forestalling the Farmers

Farmers want electric service and utilities must supply it, Bert H. Shepard, chairman of the committee on rural lines, declared. Failure to supply this need will bring about the same objectionable condition that arose in the early days of telephone development. Strenuous efforts must be made to educate farmers regarding the cost of such service and the convenience and economy of using electricity.

E. P. Peck, superintendent electrical department, Utica Gas & Electric Company, referred to the aggressive action of farmers in the Middle West and urged that central-station companies get in line and serve farmers before the farmers force them to do so under conditions which will not pay for cost of rendering service. The demand should be based on the equipment installed to serve a customer.

The committee on demand rates, of which F. W. Smith was chairman, expressed the view that there existed entirely too great a diversity in these rates. This view was supported by J. T. Hutchings and E. P. Peck. The latter thought kilovolt-ampere demand rather than kilowatt demand to be the important factor. C. G. M. Thomas opposed the establishment of rates or minimum guarantees for the express purpose of attracting business.

W. C. Pearce, Syracuse Lighting Company, expressed the belief that one standard of demand billing is not necessary, but that the number of demand intervals and methods of billing can be reduced. The chief difficulty will be with small companies.

C. A. Barton, New York & Queens Electric Light & Power Company, contended that demand should be on a yearly basis because equipment required is permanent. On railroad loads the integrated demand for one hour will be satisfactory, he believed.

F. B. Steele, Utica Gas & Electric Company, pointed out that the Ohio Electric Light Association found very little difference in registration at different time intervals on average loads and has adopted a thirty-minute interval as standard for such conditions. Utica has done likewise, but uses a different interval for fluctuating or intermittent loads.

H. A. Lane of the Joint Committee on Business Development asserted that only 8 per cent of the available business in this country is served.

To assist small companies to solicit power business more successfully it was suggested by the Commercial Section chairman, H. A. Doering, that large companies might arrange to lend their power sales engineers at a definite rate. It was also recommended that advertising and other publicity effort be extended to include utility problems and service to the public.

The Public Service Commission of the State of New York has been petitioned to adopt the uniform system of accounting prescribed by the National Electric Light Association, H. O. Palmer, chairman of the accounting committee, reported.

Several engineering or technical practices that need investigation were emphasized in the reports of the electrical and meter committees, of which L. C. Smith and E. E. Hill respectively were chairmen.

Practices Needing Attention

Mr. Smith directed particular attention to a set of tables which have been prepared by a sub-committee of which E. P. Peck is chairman to facilitate selection and building of transmission lines. They give recommended wire spacings and clearances, details of construction and costs. Recommended boiler-room control and banking practices were also outlined, and attention was called to the variances in transformer fusing practice and the need of investigating the relative merits of tree wires and thermal-type load indicators.

Mr. Hill reviewed the work which has been done to formulate demand-meter acceptance tests and emphasized the great variety of demand intervals used. He suggested studies of demand-meter troubles, remedies and maintenance, demand-meter rates with a view toward standardizing, meter installation practices, and maintenance methods and records.

Widely opposite opinions exist regarding the transmission-line recommendations made by the sub-committee on transmission lines, said E. P. Peck, chairman. Some think they are too drastic, others that they are too lenient. Mr. Peck called attention to the lack of satisfactory fuses for voltages of 2,300 and above.

M. J. Brayton, vice-president Utica Gas & Electric Company, was elected president of the association for the ensuing year. The next convention of the Empire State Gas and Electric Association will also be held at Lake Placid.

Tribute Paid to C. L. Edgar

Boston Edison Officials and Employees Celebrate His Thirty-five Years With the Company

IN HONOR of the thirty-fifth anniversary of President C. L. Edgar's connection with the Edison Electric Illuminating Company of Boston, virtually all the bureau and department heads of the company and their principal assistants, together with numerous employees, tendered a complimentary luncheon to their chief executive at the Massachusetts Avenue Service Buildings on Sept. 29. E. S. Mansfield officiated as toastmaster and addresses of congratulation were made by William H. Atkins, general superintendent of the company; John W. Lieb, vice-president of the New York Edison Company; L. H. Howe, Jr., president Boston Edison Employees' Club, and others.

A FEW OF THE OFFICIALS AND EMPLOYEES WHO MET TO CONGRATULATE MR. EDGAR
Mr. Edgar and Mr. Lieb in front row, center

At the luncheon the gathering was composed entirely of Edison employees, the food being cooked by Edison service and the floral displays raised in company gardens, while young women employees served the guests and hosts. In greeting Mr. Edgar Mr. Mansfield said that the employees and officers of the company considered themselves fortunate in being associated with an administration so unusual in length of service and remarkable in accomplishment, the company having grown from a small organization to one of magnificent proportions under Mr. Edgar's leadership. Mr. Lieb offered the felicitations of the sister Edison companies of the country. "It has been my good fortune," he said, "to be associated with Mr. Edgar in many things that had to do with the formulation of general policies. This association has resulted in a deep attachment to the guest of honor, a deep feeling of regard for his personality and for his high ideals of company management and service to the public." Mr. Lieb touched upon the indebtedness of the central-station industry to Mr. Edgar's broad insight and liberal thinking, his judgment and influence.

On behalf of the employees, Mr. Howe presented Mr. Edgar with a share of the company's capital stock, suitably inscribed, as a tribute to his leadership and concern in their welfare and also with a well-stocked humidor. An unusual gift from Mr. Edgar's official associates took the form of a pair of book ends designed to represent the façade of the L Street station in South Boston and made of copper tubing which had transmitted energy in regular Edison service for from thirty to thirty-six years. Walter C. Baylies, vice-president, spoke for the stockholders and directors. In a feeling response Mr. Edgar paid high tribute to the loyalty and abilities of the company's personnel throughout his administration.

Staten Island Company Under New Management

Through the purchase of the interest of the H. H. Rogers estate in the Richmond Light & Railroad Company, which furnishes light and power and owns the trolley system on Staten Island, N. Y., by a syndicate headed by J. H. Pardee, president of the J. G. White Management Corporation, the way has been prepared for the reorganization of the company, which is now in the hands of a receiver. Mr. Pardee has been elected its president. No details of the purchase price were made public, but it is said to have been between $12,000,000 and $15,000,000. Staten Island, as the Borough of Richmond, forms part of Greater New York.

Code for Electricity Meters Approved by A. E. S. C.

The code for electricity meters submitted by the National Electric Light Association and the Association of Edison Illuminating Companies has received the unanimous approval of the main committee of the American Engineering Standards Committee as "American standard." It is expected that the approval of this code by the A. E. S. C. will bring it into even more general use and will have the effect of greatly reducing the possibility of controversies concerning the installation and performance of electricity meters between meter manufacturers and electric service companies, between service companies and electricity consumers, and between utility commissions and electric service companies.

The Association of Edison Illuminating Companies and the N. E. L. A. have been appointed joint sponsors for the future revision of the code.

The S. P. E. E. Advances Its Program of Education

The development committee of the Society for the Promotion of Engineering Education has reported plans for the future, their execution being contingent on the provision of the required funds. The committee, which consists of F. W. McNair, M. E. Cooley, D. C. Jackson, J. H. Dunlap, F. L. Bishop and Charles F. Scott, believes the two chief questions in engineering education to be, first, what the engineer graduate should be, and, second, what the training of the engineering student and the influence surrounding him should be.

In its consideration of the first of these questions the committee holds that the past, present and future should be studied; to answer the second, it says, it will be necessary to express definitely the ideals of service and training. There is a necessity to study the needs of civilization, of the profession of engineering and of industry in order to arrive at right conclusions as to the training of the student and the machinery of education.

The committee recommends the establishment of a board of investigation and co-ordination, to consist of a staff of investigators with a director and, in addition, a body of counselors embracing representatives from the several fields concerned in the investigation. The work of the board would be to ascertain facts as regards (a) teachers, their origin, training, experience and effectiveness; (b) teaching facilities; (c) curricula; (d) students and graduates, their origin, training, experience and effectiveness. The board would, in addition, study the future requirements in engineering education, cooperate and establish points of contact with schools and raise funds for these purposes. Dean M. E. Cooley of the University of Michigan, has been proposed as the director of the board.

President Smith on Great Lakes Division

Chief Executive of the National Electric Light Association Pays Tribute to the Electrical Achievements of the Middle West and Its Work in Promoting Good Public Relations

A FEATURE of the geographic division conventions of the National Electric Light Association held in the last few months has been the presence of Frank W. Smith, the national president, and his addresses in appreciation and encouragement of divisional enterprise. At the Great Lakes Division convention at French Lick Springs, Ind., Mr. Smith was the chief speaker at the banquet held on Sept. 28. On this occasion he said in part:

"I should fall short of my duty if I did not say something with particular reference to the large and important interests operating within the territory comprised in the Great Lakes Division. In this territory, made up of the four great states of Illinois, Indiana, Michigan and Wisconsin, you will find exemplified all of the great advances made in the electric light and power business since its foundation forty years ago. Particularly in the more recent phases of the work does this section shine. Here you have recognized your primary duty of mutual help. You occupy a dominating position in the economical production of electrical energy from steam. The remarkable degree of efficiency displayed by the great central-station companies—among the largest in the world—has resulted in a very low average rate for electrical energy, of which the consuming public is receiving the benefit.

"In the development of water power the states within this section have likewise shown commendable energy and foresight. Wisconsin and Michigan abound with modern hydro-electric developments, while to the south, where flows the Father of Waters, there is found the world-famed development of the Mississippi Power Company at Keokuk.

"You have grasped the value and meaning of interdependence. From St. Paul and Minneapolis on the north to St. Louis on the south, and from Keokuk on the west to Terre Haute on the east, there is a general flow and interchange of energy partly obtained from water power, partly from stations at coal mines and partly from superpower stations strategically located as regards coal, water supply and load.

"The use made of electricity in this territory is also as diversified in extent as are its ramifications in area, and the diversity of the demand is such as to cause almost full use of the investment at all times.

Progressive Public Relations

"In the matter of public relations your section occupies a position in the front rank. Here was started the first committee on public utility information, the one in Illinois. Here customer ownership of stock was adopted as a policy almost from its inception and is being pursued energetically by the large interests as well as the relatively small companies.

"In this matter of customer ownership a recent announcement is of great interest, that telling of the formation of the Utilities Securities Company in Chicago, intended to succeed the investment department of the Commonwealth Edison Company, the Public Service Company of Northern Illinois and the Middle West Utilities Company.

"Right now extensions into rural communities are a vital issue with our member companies. We recognize how necessary it is for growing cities to be surrounded by prosperous rural communities and to what extent our well-being is wrapped up with the welfare of the farmer. For an enlightened solution of the problem incident to rural service we naturally look in a large degree to the power companies in this section.

"This question of rural-line extension is one of very great importance to a vast group of our member companies and is receiving attention in a national way from our association. There are many problems involved, the questions of financing, adequate rates and so forth, and as a result of the intensive study that is being made by our national committee, tied in, as it is, with all the committees in the geographic divisions, this subject will find a proper solution.

Pride in the Industry

"On a recent trip through the Far West I was amazed at the large number of sparsely settled communities, without streets, sewers, water supply or any other public service, yet enjoying all the civilizing advantages that electricity can give. Amazement gave way to pride when I pondered on the significance of that achievement of the electrical industry of which I was a part. In this matter of pride in the industry, which I am sure we all feel so greatly, I was struck by remarks recently made by Past-president Martin J. Insull. He said: 'One of the attractive things to me in the utility business is the fact that we are in a business where we really are doing something for the other person. He may not know it, but we are doing it nevertheless. I have often thought that possibly I might have procured a far greater financial return in some other business than the utility business during the many years I have been in it. However, I have never thought once of leaving it for some other business. I do not want to be in a business where I am just trading dollars. I want to be in a business where I am creating something, so that when the end comes I shall feel I have done something while I was here.'

"I pay tribute to the Great Lakes Division and the four great states within it and to the great organizations within this territory which have contributed so much to the industry and have been such loyal supporters of the work which the National Electric Light Association is seeking to do for the upbuilding of the electric light and power business."

Indiana Electric Corporation Suit Before Higher Court

The Indiana State Supreme Court has just heard oral arguments on the validity of the consolidation of seven Indiana light and traction companies into the Indiana Electric Corporation. This consolidation was authorized by the Indiana Public Service Commission last January and was later, at the instance of Indianapolis and Kokomo, declared by Judge Linn D. Hay of Indianapolis to be unlawful. Attorneys for these cities declared that the law did not give the commission the right to authorize utilities to sell their own property to themselves through the agencies of their own companies or to issue stocks and bonds on such property to the extent of $7,200,000 more than the fair present value of the property. Attorneys for the corporation maintained that the law permitted any corporation to buy another corporation, regardless of whether they furnished similar service valuations of the property for the purposes of the sale. The issuance of securities beyond a certain valuation was not an evidence of fraud, they said, because opinions did not agree on the correctness of the valuation.

The companies united by order of the commission are the Merchants' Heat & Light Company of Indianapolis, the Elkhart Gas & Fuel Company, the Valparaiso Lighting Company, the Indiana Railways & Light Company of Kokomo, the Putnam Electric Company of Greencastle, the Cayuga Electric Company and the Wabash Valley Electric Company of Clinton.

Tenney Service Convention Hears Practical Talks

More than 250 officials of utilities under the management of Charles H. Tenney & Company, Boston, assembled Oct. 4 and 5 at the New Ocean House, Swampscott, Mass., for the thirteenth annual convention of the organization, the program being based upon current economic and regulative conditions in the central-station and gas industries. An address was given by Senator Lodge. The speakers at the business sessions were: Col. Charles H. Tenney, opening address; Prof. J. J. Mahoney, Harvard University, "Industry and Non-English-Speaking Employees"; Gen. A. E. Bliss, Malden Electric Company, "Inspection"; B. F. Griffin, associate editor Boston News Bureau, "Business, Finance and the Public Utilities"; Dana D. Barnum, Boston, "The Gas Industry Today"; Everett W. Burdett, Boston, "Steps in Regulation of Public Utilities," and Walter Camp, New Haven,

"Keeping the Business Man Fit." At a dinner on Wednesday evening Alvin T. Simonds, president Simonds Manufacturing Company, Fitchburg, Mass., addressed the convention upon "Conditions in Europe and How They Affect Us," and H. C. Attwill, chairman Massachusetts Department of Public Utilities, spoke upon "Regulation." A program of recreation and sports occupied the second day.

Brief News Notes

Interconnection in Texas.—The Dallas Power & Light Company is just completing the construction of a 60,000-volt steel-tower transmission line to connect with the Texas Power & Light Company's transmission system at Trinity Heights. With this new line in service it will be possible to transmit power from Waco and Fort Worth to Dallas over two entirely different routes, thus making a suspension of service almost impossible under normal conditions.

New Company Takes Over Spartanburg Utility.—The South Carolina Gas & Electric Company, succeeding the South Carolina Light, Power & Railways Company, began service in Spartanburg on Oct. 1. All the business and property of the old company were taken over by the new one, which announces that the sum of $300,000 will be expended in improving its facilities. The South Carolina Light, Power & Railways Company was sold at auction to the bondholders of the company several weeks ago.

Southern Power Company to Build Two Steam Plants.—Two large reserve steam-electric plants are to be built very soon by the Southern Power Company to supplement its service in seasons of dry weather or other emergency. One of these plants, to be rated at 40,000 hp., will be built at Mountain Island, N. C., where the company is also building a great hydro-electric plant, and the other one, rated at 20,000 hp., will be built at Eno, N. C., where the company already has a steam plant. The new installations will more than double the capacity of the company's existing steam generating stations. They will cost, it is said, about $2,000,000.

How Tacoma and Seattle Plan to Exchange Power.—Arrangements have been completed whereby the municipal plants of the cities of Tacoma and Seattle, Wash., will exchange power in case of high demand or emergency conditions on the generating system of either city, as previously announced in the *Electrical World*. The scheme of connections, which was designed by engineers of the Westinghouse Electric & Manufacturing Company, although somewhat elaborate in design, is very simple in operation. The generating plant of each of the cities transmits power at approximately 50,000 volts. The maximum amount of power to be exchanged is 15,000 kva., and a 15,000-kva., three-phase water-cooled transformer having approximately a one-to-one ratio will be used to tie the two generating systems together. One side of the transformer will be provided with a number of taps, and a tap-changing device will be supplied to vary the ratio of transformation by means of the taps so that it will be possible to equalize the voltages of the systems one with the other and also to control the amount of the regulation. Instead of transferring abruptly from tap to tap, a small induction regulator will be used to give any intermediate voltage between the taps. The induction regulator will be excited from an auxiliary winding on the main transformer and will vary the voltage of a small series transformer having two secondary windings per phase. These windings will be transferred from tap to tap of the main transformer in such a way that it will be possible to obtain any voltage from the maximum to the minimum. The regulator will be operated by a small motor, and the various switches will be positively geared to the regulator mechanism so that the entire range in voltage will be controlled by operating two push-buttons, one to raise and the other to lower the voltage.

Federal Government Extends Power Plant.—Extension of the United States Capitol power plant so as to furnish steam heat and electric light and power to the Government Printing Office and the Botanic Garden in addition to the buildings previously served, which included the Capitol, the Library of Congress and the House and Senate office buildings, is expected to effect economies of operation of more than $100,000 a year. Coincident with abandonment of its independent steam plant, the Government Printing Office is installing an electric substation with transformers capable of taking care of much more than the immediate power needs of the establishment. The Washington Post Office, which has received heat, light and power from the Government Printing Office, also will be linked to the Capitol power plant when the change is made. Contracts for all the work and equipment, with the exception of the transformers, have been awarded, and work is in progress.

Only 6 per Cent of Accidents in Electric Plants Due to Shock.—An analysis of 5,582 accidents to employees of electric plants in Pennsylvania during the last five years, made by the accident prevention and safety rules committee of the Pennsylvania Electric Association and embodied in the report of that committee to the recent convention at Bedford Springs, shows that only 327 casualties, or 6 per cent of the total, were due to electric shock. These, however, were responsible for 53 of the 101 fatalities. The most prolific source of accidents is listed as "moving and unloading material," 1,297 casualties falling under this head. The other sources of accident giving rise to more than 100 injuries were: Hand labor, 606; falls other than from ladders or poles, 450; injuries from falling materials, 439; burns other than electrical, 357; eye injuries, miscellaneous, 349; moving and assembling material, 246; falls from ladders, 219; injuries from self-propelled vehicles, 196; injuries from nails, 152; injuries from machine tools peculiar to industry, 136; infection from cuts, etc., 116; injury from miscellaneous vehicles, 103; falls from poles, 101. There were thirty-nine injuries from short circuits, twenty-eight received in operating motors and generators, twenty-one eye injuries from electric flash and fifteen from explosions.

Associations and Societies

Southwestern Division, N. E. L. A.—The executive committee of the Southwestern Geographic Division of the National Electric Light Association at a recent meeting in Dallas selected Oklahoma City as the meeting place for the 1923 convention, to be held in connection with the annual convention of the Oklahoma State Utilities Association. The joint convention will be held during March or April, the exact date to be fixed later.

Section Meetings of the Institute.—C. F. Hood of the American Steel & Wire Company, Worcester, Mass., will read a paper on the manufacture of wire before a meeting of the Worcester Section, A. I. E. E., on Oct. 19. On Oct. 24 a demonstration of the portable oscillograph will be made before the Akron (Ohio) Section by J. W. Legg of the Westinghouse Electric & Manufacturing Company. The Philadelphia Section will meet on Nov. 13, when a paper on the trackless trolley, by J. A. Queeney and J. F. Collins, will be presented.

Coming Meetings of Electrical and Other Technical Societies

A complete directory of electrical associations is published in the *Electrical World* in the first issue of each volume. See July 1 issue for latest list.

Society of Industrial Engineers—New York, Oct. 18-20.

Public Utilities Association of West Virginia—Charleston, W. Va., Oct. 20-21. A. Bliss McCrum, Charleston, W. Va.

Electric Power Club—Asheville, N. C., Oct. 30-Nov. 2. S. N. Clarkson, Kirby Bldg., Cleveland, Ohio.

Arkansas Utilities Association—Hot Springs, Ark., Nov. 7 and 9. R. P. Brown, Little Rock Ry. & Electric Co., Little Rock.

Electrical Credit Association (interstate convention)—Philadelphia, Nov. 10. J. W. Crum, 1328 Land Title Bldg., Philadelphia.

Ontario Association of Electrical Contractors and Dealers—Toronto, Nov. 13-14. J. A. McKay, 24 Adelaide St. W., Toronto.

National Association of Railway and Utilities Commissioners—Detroit, Nov. 14-17. J. B. Walker, New York Transit Commission, New York.

Electrical Credit Association, Central Division—St. Louis, Nov. 16-17. F. P. Vose, 1347 Marquette Bldg., Chicago.

Electrical Supply Jobbers' Association—Cleveland, Nov. 20-24. Franklin Overbagh, 411 S. Clinton St., Chicago.

American Society of Mechanical Engineers—New York, Dec. 7-13.

Commission Rulings

Income Tax Chargeable Against Profits.—Income tax was deducted from the operating expense account of the Colorado Power Company by the Colorado Public Utilities Commission as not a proper charge against revenue, it being properly chargeable against profits.

No Excuse Can Palliate Dangerous Construction.—In a complaint brought by the municipality of New Cambria against the Bucklin Light & Power Company inadequate rates were urged as a reason for the improper construction of a transmission line and electrical distribution system. The Missouri Public Service Commission emphatically refused to entertain the plea, declaring: "Inadequacy of rates is no justification for construction that is not only unserviceable but eminently dangerous to human life, which is the condition disclosed by the testimony before the commission."

Securities of Overcapitalized Utility.—That overcapitalization does not justify the refusal of authority to issue necessary bonds for extensions and additions was maintained by the Missouri Public Service Commission in a case recently before it affecting the City Light & Traction Company of Sedalia. The commission also held that it has authority to authorize stock and bond issues to acquire funds to make replacements to an electric plant even where the security issues were made necessary because of the failure of the company to maintain an adequate depreciation reserve in spite of earnings sufficient for that purpose.

Customer Neglecting to Avail Himself of Most Advantageous Rate Schedule Cannot Allege Overcharge.—Complaint was made in Munn vs. the Commonwealth Edison Company of Chicago because the schedule under which the complainant was billed was not so advantageous to him as another one where a change had been made in the minimum charge. The Illinois Commerce Commission dismissed the complaint, saying: "The issue is whether a utility, after having notified a consumer of a more advantageous rate under which he may receive service, is under obligation to make reparation when the consumer has not taken advantage of the opportunity offered him to enter into a more advantageous contract. It is the opinion of the commission that the Commonwealth Edison Company, through its notification to the complainant's agent of a possible saving and through its offer to make changes in its contract which would reflect to the advantage of the consumer, fulfilled its reasonable obligation, and any loss which the consumer experienced as a result of the failure to take advantage of the more favorable rate should not be charged to delinquency on the part of the utility."

Flat Rate Abolished.—The Public Utilities Commission of Utah has authorized the Clark Electric Power Company to discontinue its former flat rate for lighting service in Tooele and required it to publish and file with the commission a meter rate covering the furnishing of electrical energy for water heating. The company reported that of approximately 600 customers for lighting in Tooele, the only place where the flat rate for lighting obtained, only ninety-five were actually paying the flat rate. It was sought to remove this form of service entirely, on the grounds of discrimination and of waste. The power company also asked permission to cancel its present rates for water heating but the commission found that this could not reasonably be done because in that event customers would be without such service.

Occupied Territory Inadequately Served May Be Allotted to Others.—In granting a certificate of convenience and necessity to one Charles L. Ward to build and operate an electric plant at Greenfield, Mo., notwithstanding that the Greenfield Light & Power Company owns and operates a plant in that city, the Missouri Public Service Commission expressed its conviction that a new electric utility may be authorized to operate in a community where it appears that the existing company has failed to render adequate service and, on account of lack of means and ability to procure means and because of other conditions surrounding the utility, is unable to furnish the service to which the public is entitled. The owner of the new utility was directed to purchase the plant and equipment of the existing company as a condition of obtaining the desired certificate of convenience and necessity.

Why No Value Attaches to Franchises.—In explanation of why it allowed only sums that had been actually and lawfully expended for franchises to be charged to capital the Public Service Commission of Montana recently observed: "A franchise as such ordinarily has no value for rate-making purposes. This is not because, as is sometimes stated, a franchise is a 'gift of the people,' for there is no element of gift or donation therein. A reading of almost any franchise manifests this fact, and particularly of franchises granted to and held by public service corporations. In return for the right of occupancy the city or other political agency exacts from the grantee or its successors obligations whose proper performance is of great importance to the public and fraught with heavy responsibilities to the corporation. Far from issuing as gratuities, franchises are bartered for a *quid pro quo*. The true ground for refusing any valuation to franchises is found in the fact that they no longer confer any immunity from regulation."

Recent Court Decisions

Contract Giving License to Use Reservoirs Does Not Create Easement.—In McLeod vs. Colorado Power Company the plaintiff claimed an easement in certain lands which the defendant company had acquired from the Electric & Hydraulic Company. The last-named company had granted to the plaintiff the right to use for boating, fishing and resort purposes reservoirs to be constructed by the company and the lands adjoining them under restrictions which guarded against interference with the company's use of the stored water for power or other purposes. The projected reservoirs were never built, and the defendant denied that the agreement gave the plaintiff any ownership or license in the land, inasmuch as such an interest was contingent on the creation of the reservoirs. This contention the Supreme Court of Colorado, affirming the judgment of the lower court, has sustained. (208 Pac. 463.)*

Statute Fixing Confiscatory Rates for a Foreign Corporation Held Invalid.—The United States District Court for the Eastern District of South Carolina has, in Southern Bell Telephone & Telegraph Company vs. Railroad Commission, granted to the plaintiff a permanent injunction against the enforcement of rates fixed by the commission under the terms of a statute which provided that no telephone or telegraph company should charge a higher rate than was legally in effect on Jan. 1, 1921. The federal court said: "While it may be conceded that no right in perpetuity exists on the part of any foreign corporation to carry on business and remain within the state, yet equally it must be denied that the state has the right by a sudden and arbitrary exclusion practically to sacrifice and confiscate the property of any such corporation. If it should exercise that power of exclusion under the guise of regulation, it can do so by giving to the corporation which has been allowed to establish itself legally within the limits of the state such a reasonable time for realization upon its property and securities and retirement from the state as would as a judicial question equitably meet the situation. So, conversely, a public service corporation exercising its right to cease carrying on its business because of its inability to earn a reasonable return from its operation might be restrained from doing so for such a reasonable time as would permit the state to meet the situation and endeavor to provide for the service of the public." (280 Fed. 901.)

*The left-hand numbers refer to the volume and the right-hand numbers to the page of the National Reporter System.

Men of the Industry

Changes in Personnel
Accomplishments, Responsibilities, Honors, Appointments and Activities of Men Engaged in all Branches of the Electrical Industry

J. F. Dostal Elected President Rocky Mountain Division, N. E. L. A.

J. F. Dostal, general manager of the Colorado Springs (Col.) Light, Heat & Power Company, is the newly elected president of the Rocky Mountain Division of the National Electric Light Association. He was graduated from Purdue University in 1902 and in the same year entered the engineering department of the Denver Gas & Electric

J. F. DOSTAL

Company. After several years in charge of distribution he became electrical superintendent. He has been general manager of the Colorado Springs company since 1911 and has been prominently identified with organized effort in the electrical industry since 1902. Mr. Dostal served a term as president of the Colorado Public Service Association, is now a member of the Rocky Mountain Committee on Public Utility Information and is prominent in the affairs of the Rotary and Engineers' clubs of Colorado Springs.

W. A. Baehr has been elected president of the St. Cloud (Minn.) Public Service Company, succeeding A. G. Whitney.

R. F. Burkhart, formerly engineer with the Luzerne County Gas & Electric Company, has joined the American Gas Company, Philadelphia.

H. Baker, formerly associated with the West Penn Power Company, has taken a position in the service department of the Duquesne Light Company.

H. E. Dawson has been appointed secretary of the Rhode Island Electrical League, with headquarters at Providence.

C. Voetsch, formerly hydraulic and electrical engineer with the Utica Gas & Electric Company, is now connected with the Adirondack Power & Light Corporation in the same capacity.

W. W. Hill, formerly connected with the Alabama Power Company as electrical material engineer, has joined the staff of the Alabama Polytechnic Institute as instructor.

H. B. Zimmerman, secretary of the Atlas Crucible Steel Company, Dunkirk, N. Y., for the past four years, recently resigned his position to become general manager of the Western New York Electric Company of Jamestown, N. Y.

W. P. Schwabe Committeeman of New England N. E. L. A.

At a convention held recently in New London Walter P. Schwabe, vice-president and general manager of the Northern Connecticut Light & Power Company, was elected a member of the executive committee of the New England Division of the National Electric Light Association.

F. G. McRae has severed his connection with the Willys Light Systems, where he was engineer, secretary and treasurer, to become sales engineer for Electric Service Supplies, 610 Monadnock Building, Chicago.

A. D. Holmes, formerly with the New England Power Company, has resigned his position as superintendent of the Uxbridge steam plant to become associated with the Central Maine Power Company at Gardiner, Me.

Milo Smith Ketchum was recently appointed dean of the College of Engineering and director of the Engineering Experiment Station of the University of Illinois. The new dean and director brings to this administrative office a wealth of experience in the engineering field, gained through association in various capacities with the Michigan College of Mines, University of Illinois, University of Colorado and the University of Pennsylvania. In addition, Dean Ketchum was at one time connected with the Gillette-Herzog Manufacturing Company as contracting and designing engineer and later with the American Bridge Company as contracting manager in charge of the Kansas City (Mo.) office. He has carried on a consulting practice for twenty years and has had considerable experience in valuation work and in giving expert testimony. He has written several books on designing and structural engineering and has contributed many articles to the technical press.

Samuel Ferguson, vice-president of the Hartford Electric Light Company, has been elected a director of the Hartford Steam Boiler Inspection & Insurance Company.

D. E. Byerley, formerly connected with the Montgomery Light & Water Power Company, Montgomery, Ala., in the capacity of general superintendent, is now associated with the Hattiesburg Traction Company as general manager.

J. B. Black General Manager Great Western Company

J. B. Black, formerly general sales manager of the Great Western Power Company of San Francisco, has been appointed general manager of the company. He became associated with the Great Western Power Company immediately following his graduation

J. B. BLACK

from the University of California in 1912, rising rapidly from one position to another. Mr. Black is one of the active figures in the electrical industry in the West, having been chosen president of the Pacific Coast Electrical Association for the coming year at the recent convention of that organization at Los Angeles in June. He is a member of the advisory committee of the California Electrical Co-operative Campaign and has been instrumental in the success of that organization.

Changes in Personnel of San Joaquin Company

A. M. Frost, formerly manager of the Fresno district of the San Joaquin Light & Power Corporation, has been appointed manager of sales of the same company and the Midland Counties Public Service Corporation. Paul Wilson, formerly manager of the Madera district, has been appointed manager of the Fresno district, and F. V. Boller, formerly manager of the Santa Maria district of the Midland Counties Public Service Corporation and recently head of the right-of-way department of the San Joaquin Light & Power Corporation, has been appointed manager of the Madera district.

W. F. Brown Elected President of the Colorado P. S. A.

Walter F. Brown, general traffic manager of the Mountain States Telephone & Telegraph Company, Denver, was elected president of the Colorado Public Service Association at its recent Glenwood Springs convention. After his graduation from Yale Mr. Brown became identified with the Bell Telephone System in New York City in 1893. Several years later he was transferred to Colorado, and since 1900 he has successively held the positions of manager of operating department, superintendent of traffic, assistant general manager, division general manager, traffic superintendent and general traffic manager. He was prominent in the affairs of the former Colorado Electric Light, Power and Railway Association and during 1920-1921 was chairman of the electrical bureau of the Denver Civic and Commercial Association. Mr. Brown has the distinction of being the first telephone man in many years to head the Colorado Public Service Association.

W F. BROWN

Harold Calvert has terminated his work with the Philadelphia Electric Company to accept the position of president of the Baird-Osterhout Company, Philadelphia.

Frank E. Dyson, assistant general agent Universal Winding Company, Providence, R. I., a position he held for seventeen years, has resigned to devote his entire attention to the affairs of the Electrical Products Manufacturing Company of that city, of which he is president.

M. H. Sarben, who was recently appointed vice-president of the Bleadon Dun Company, Chicago, joined the organization in March, 1921, to establish its New York sales office. Previous to his connection with the Bleadon Dun Company he was associated with the Theodore Stove Company, engineer and exporter.

W. H. Price, formerly electrical engineer with the General Machinery Company, Birmingham, Ala., is now connected with the Midvale Steel & Ordnance Company in the capacity of electrical foreman.

Laurence E. Frost has resigned from the Western Electric Company and has taken a position with the Brooklyn Edison Company, where he will be technical assistant to the electrical engineer.

W. W. Miller, formerly of the engineering department of the Cutler-Hammer Manufacturing Company, has been appointed head of the engineering department of the Lewis Electric Company, switches and control equipment, Minerva, Ohio.

W. J. Sanger has been appointed chief engineer of the Winnipeg Hydro-Electric System in succession to E. V. Caton, who has resigned, to join the engineering staff of the Manitoba Power Company, Winnipeg.

Howard Cole Hakes, formerly associated with the Charles R. Ablett Company of New York City, has joined the Betts & Betts Corporation as special sales representative and will work in the State of New York, including New York City.

T. M. Feder has been appointed special representative of the Illinois Electric Porcelain Company, Macomb, Ill. He will be chiefly interested in the development of the high-tension business of the company. Mr. Feder is a graduate of the Brooklyn Polytechnic Institute, where he was later an instructor. He was previously connected with the New York office of the Esterline-Angus Company.

E. F. Irlbacker has been appointed head of the fixture department of the Hartford (Conn.) Electrical Supply Company. Mr. Irlbacker spent the past four years in similar work with Hitt & Brown, Norfolk, Va., and prior to the war was on the staff of Mitchell, Vance & Company, New York, for about fifteen years. In his new post he will have charge of both wholesale and retail sales.

W. H. Rolinson Manager of Westinghouse Interior Lighting

W. H. Rolinson has been appointed manager of the interior lighting section of the merchandising department of the Westinghouse Electric & Manufacturing Company. Mr. Rolinson is a graduate of Cooper Institute, New York City, and of Columbia University. For ten years, from 1902 to 1912, he was in charge of the incandescent-lamp inspection of the Association of Edison Illuminating Companies, under the direction of the Electrical Testing Laboratories, New York City. From 1912 to 1921 he was with the Westinghouse Lamp Company as commercial engineer, having charge of the commercial engineering department, and in 1921 he was made assistant to the sales manager of that company, a post he held until his present appointment. Mr. Rolinson is a member of several engineering associations among which are the N. E. L. A. and the I. E. S.

R. C. Cole Sales Manager of the Johns-Pratt Electrical Division

Robert Charles Cole, who was recently appointed sales manager of the electrical division of the Johns-Pratt Company, Hartford, Conn., is widely known in Eastern electrical manufacturing circles and has frequently been consulted as an expert upon electrical protection problems by utilities in different parts of the country. Mr. Cole was born at New Haven in 1881 and as early as 1892 became associated with Ralph W. Pope, secretary of the A. I. E. E., assisting him in connection with the World's Columbian Exposition in Chicago in 1893. His acquaintance at that time with prominent electrical men influenced him to enter into the electrical industry, and about 1900 he entered the engineering department of the Johns-Pratt Company. In 1905 he was appointed electrical engineer, and has continued in that post until his recent appointment as sales manager of the electrical division. Mr. Cole is a member of the A. I. E. E., the N. E. L. A., the Hartford Electrical Club and other societies. He has been active in the Fuse Section of the Associated Manufacturers of Electrical Supplies and in the general standards committee of that association.

R. C. COLE

G. A. Reinhard has been placed in charge of the Cleveland office which the Industrial Controller Company, Milwaukee, has recently opened.

Prof. I. W. Gill, head of the department of mechanical and electrical engineering at the University of British Columbia, Vancouver, has been appointed principal of the Hamilton Technical School. He will assume his new duties on Nov. 1.

P. C. Idell was recently appointed manager of the New England office of the Babcock & Wilcox Company with headquarters in Boston. Mr. Idell has been connected with the company's engineering and sales departments for a period of twenty-three years.

Manufacturing and Markets

Devoted to the Discussion of Business and Economic Problems of the Producer and Distributor, with Market Reports, Trade Activities, Foreign and Construction News

An Interview with W. A. Layman

President of the Wagner Electric Manufacturing Company Outlines Business Conditions in the Electrical Industry and the Reorganization Plan of His Company

By Daniel H. Braymer
Editor *Industrial Engineer*

BETWEEN the time of the peak demands before and during 1919 and a part of 1920 and the present date electrical and all other manufacturers have devoted some terse thinking to matters of ordinary economies of "housekeeping," with the result that they are richer in experience and better fitted to develop their business of production and distribution without waste and with profits that are more closely in proportion to the demands which they supply in competing with all comers the world around.

Costs Being Studied

This thinking has included a thorough analysis of the economic proportions of the cost of materials and labor in the manufacture of any product and the balance that must be maintained in manufacturing and executive overhead expenses. It has also brought about new considerations in the economic use of materials and an elimination of waste in production that will play a part in unit production costs of the future. Just how these developments will be reflected in the development of electrical manufacturing as a business, time with its attendant demands from all lines of industry will reveal. Just what the future holds as a normal business for electrical manufacturers is a grave problem of speculation, but there are basic indications which furnish significant indexes.

In discussing these topics with the writer, W. A. Layman, president of the Wagner Electric Manufacturing Company, St. Louis, has given the following interview expressing his views and experience in the management of the company during the war and the period of adjustment following it and its financial reorganization on a new and larger plan of operation, together with comments on business conditions in general. Mr. Layman said:

Industry Is Not Seriously Overbuilt

"I am very strongly of the opinion that the general public is under an entire misapprehension as to the degree of industrial expansion of the nation during the war. Although arrangements were completed and manufacturing operations created for a vast war business along new and unparalleled lines in kind or volume, I am convinced the manufacturing floor space of the country as a whole was not permanently increased to anything like the degree popularly imagined. A careful analysis would, I think, disclose that the assumed tremendous industrial expansion of the nation was apparent rather than actual, and the 'large production' reached was in reality a combination of, first, high unit prices; second, the double-time basis of war operations, and, third, the wide employment of temporary facilities through the conversion of space used normally for peace requirements into the manufacturing of products essential to war. Insufficient labor supply alone prevented a large overbuilding of industry.

"The popular opinion seems to be that our own company made a very large expansion of facilities as a result of our war operations, but the actual fact is that our permanent floor space available for electrical manufacture was not increased to exceed 10 per cent. The Wagner company's experience in this regard is typical of the entire industrial city of St. Louis. I, therefore, believe that it will not be long until the industrial expansion of this country is resumed, and the real limit to this expansion will not be our trade opportunities, both internal and external, but the transportation capacity of the railroads and the labor supply available.

"Figures published from time to time have shown that the public utilities of this country furnishing light and power double their output every five years, but during the past three or four years they have been able only to handle existing demands of industrial and residential customers already connected. The practical fact is, therefore, that our electrical public utilities of the country are now inadequate to our immediate industrial output and must expand with the least possible delay. Financial conditions alone have held back large construction programs that might have been executed under normal conditions and will certainly be taken care of in the early future. The financial relaxation of the country makes possible the expansion of public utility organizations through immediate orders for equipment that will be placed in operation during the next twenty-four months. As public utilities are prepared to supply the service, there will be resumed the rapid expansion and also conversion of miscellaneous industrial power requirements which prevailed immediately prior to the entrance of the United States into the war.

An Encouraging Outlook

"If the rate at which electrical service has expanded in the past can be taken as a guide, we have an interesting and encouraging outlook for renewed demand for electrical equipment in all lines of industrial production, and a brief interval only of reawakened industrial activity will be required to exhaust such stock accumulations of electrical equipment as have been carried forward to the present date.

"Data published in the *Electrical World* of Aug. 19, based upon the 1919 census of manufactures, showed that the number of motors and their horsepower in industries practically doubled during the five years between 1914 and 1919 and that the energy for motor service supplied by central stations was increasing at a rate

indicating a renewed expansion of all industries during that period. If I am correct in the statement that the country was not overbuilt industrially during the war, then this normal expansion of demand for electrical service and motor supply will shortly be resumed.

LIQUIDATION WITHOUT DUMPING

"The industrial collapse of the latter part of 1920 found the Wagner company, as it did most companies, operating at a high rate of production with large inventories and heavy commitments on raw material. The only avoidance of this condition would have been to make no effort to take care of long-established business, but to pursue a dormant policy throughout the readjustment interval, a policy which, seemingly, comparatively few, if any, American industries pursued. The experience of our company throughout the readjustment interval has been very much the same as that of the majority of large companies. At the end of June, 1922, we had liquidated approximately 45 per cent of all inventories and outstanding obligations without the usual dumping process by asking fair values for all products sold. In dealing with this proposition we adopted the policy of facing the facts and readjusting inventories to the inevitable future market situation with which we were confronted. We also aggressively faced the problem of future keen competition by projecting into our business, through the readjustment interval, the best electrical, mechanical and production engineering ever employed by us, with the result that we think we are ready for the immediate future with the best quality of product, the most economical employment of material and the best shop practice we have ever had. A new design of heavy-duty 40 deg. motors is one of the products of this period of aggressive internal activity.

"There is probably no line of American industry more highly developed than the electrical, from the standpoint of excellence of apparatus designed, technical skill of sales, engineering and production organization and technical training of the purchasing public. The natural result of this situation is that the electrical manufacturer has no siesta period on his program, and the electrical consumer gets the best electrical product produced anywhere in the world at a price very low in comparison with the profits of numerous lines of industry less highly developed. The electrical manufacturer of America must progress or quickly fall behind and pass out.

"As to the condition of current business, my observation is that the entire electrical industry is returning to a healthy plane of production. In our own company we have produced during the last quarter more motors than at any time in our history. In industrial sizes the production has been running about 75 per cent of previous maximum in numbers of motors, while in the smaller sizes our output has exceeded any previous rates of production."

In reference to business-getting methods Mr. Layman said that no

W. A. LAYMAN

particular plan had been adopted, except to forget the methods of the order-taking days of war time and revive fundamental distribution methods and accurate, sound salesmanship. Boiled down, he said, this has meant just going out and getting the share of business that the Wagner company should expect by reason of the quality of its products and the service that it can guarantee to those who are buying to meet their actual current production needs. In the distribution of products Mr. Layman stated that improved results had been attained by building up the esprit de corps of the complete organization and in bringing the company's field men as well as the factory organization to see that no achievements of the past were a sufficient criterion of what the organization could and would have to do today. The company's policy has been to ask of its men consistent and steady self-development, just as they in turn look to the company to progress rather than to stand still.

With respect to credit conditions Mr. Layman said that throughout the interval of reorganization the electrical trade had maintained its long-standing reputation for financial soundness. There have been remarkably few electrical concerns unable to meet their obligations throughout the readjustment period, with the extension of reasonable co-operation and leniency in the matter of credit. Collections at the present time are satisfactory, and losses on current accounts receivable are negligible.

COMMUNITY ELECTRICAL CO-OPERATION

In the matter of co-operative effort for the development of the electrical industry Mr. Layman expressed the deepest interest and enthusiasm in the progress evident over the entire country. He referred to the splendid organization and effective co-operation of the St. Louis Electrical Board of Trade as a typical illustration and expressed the keenest interest in the plans for collective self-development of the electrical men of St. Louis contemplated in the proposed co-operative university extension work between the Washington University of that city and the St. Louis Electrical Board of Trade. It is planned to have during the ensuing year—thus perhaps establishing a precedent for the future—a carefully arranged series of instructive lectures given by the faculty of Washington University to the electrical men of St. Louis, the purpose in view being to keep these men abreast of the times in the progress and development not only of electrical science, but in the broad field of general science and industrial engineering.

FINANCIAL PLAN OF REORGANIZATION

In reference to the reorganization of the Wagner Electric Manufacturing Company and its plan for future operation and expansion Mr. Layman made the following statement:

"In accordance with a plan of financial reorganization of the Wagner Electric Manufacturing Company which was officially approved by holders of 90 per cent of the capital stock and indorsed by its directors on Aug. 11, 1922, a new company known as the Wagner Electric Corporation has taken over the operation of the former corporation and assumed all of its assets and liabilities. The new company starts with no indebtedness to the banks and with a board of directors unusually

rong in members identified with gnally successful, important indus- ies. The new board is made up as llows: V. W. Bergenthal, assistant easurer of the company; James M. uick, vice-president American Car & Foundry Company; Guilford Dun- an, president Ludlow-Saylor Wire Company; James H. Grover, vice-president St. Louis Union Trust Company; John F. Lee, attorney; W. A. Layman, president of the company; Joseph W. Lewis, attorney; Stewart McDonald, president Moon Motor Car Company; E. J. Miller, president St. Louis Screw Company; J. Herndon Smith of Smith, Moore & Company; Harry J. Steinbreder, president Fulton Iron Works Company.

The directors of the new corporation have elected the following officers:

President, W. A. Layman; vice-president, A. H. Timmerman; treasurer, V. W. Bergenthal; auditor, G. L. Evans; secretary, J. W. Westcott; assistant secretary and assistant treasurer, A. K. Bahret.

The reorganization plan is entirely a financial one, having for its purpose the funding of the company's floating indebtedness and the creation of a legal skeleton making possible a larger production and sales program in the future as the natural evolution of the company may require it, including: (1) The sale of first-mortgage 7 per cent bonds to the amount of $2,500,000 by the Wagner Electric Manufacturing Company (the old company); (2) the sale of 7 per cent cumulative preferred stock to the amount of $1,500,000 (out of an authorized issue of $3,000,000) by the Wagner Electric Corporation (the new company); (3) the issuance by the new company of 20,000 shares of its no-par-value common stock, to accomplish the refinancing and reorganization of the company.

PRESENT BUSINESS AND OUTLOOK

"Our electrical business as a whole is showing a very satisfactory volume, considering the general trade and industrial situation," Mr. Layman said. "Our production operations at the present time are on the basis of approximately 65 per cent of the maximum capacity of our plant facilities. The incoming rate of business for the second quarter of the year was at the rate of approximately 70 per cent of plant capacity. If the improvement of business which has been experienced since Jan. 1 continues, within a few months the entire manufacturing facilities of the company will be occupied.

"On the basis of the company's present volume of operations, the payment of bond interest and preferred stock dividends is assured, with a reasonable return for the common stock. With the restoration of normal national industrial conditions the outlook for the Wagner company is that its future will exceed its best achievements in the past. The company hopes to continue to constitute itself a vital and useful part of the electrical productive facilities of America and to justify by its service the support of the electrical consuming public."

Survey of Business Conditions

Holiday Buying Is Active

Holiday buying is now active and is marked with a large number of very small orders. Dealers' stocks are low, and apparently they intend to keep them down as jobbers' stocks are in excellent condition. It is the idea of one large jobber that this year's business will be better than last year's but will be slower coming, the bulk of the buying being right before the holidays. Curling irons are selling rapidly, sales being about 400 per cent of those this time last year. Flatiron sales are about the same as a year ago. Air-heater business is good but has suffered this week from the very warm weather prevailing.

Manufacturers Showed Large 1920 Incomes

The corporations engaged in the manufacture of certain electrical products, machine tools, gages, firearms, hardware and cutlery, had net incomes aggregating $53,250,232 in 1920, according to a compilation just completed by the Bureau of Internal Revenue. During that year there were 1,004 corporations engaged in this type of manufacture. Of that number 370 had no net income, but on the other hand reported deficits aggregating $7,413,469. The 634 companies reporting net incomes paid taxes totaling $11,799,859.

The compilation shows that 15,131 corporations were engaged in some type of metal manufacture in 1920. The tax paid by that industry reached the large total of $293,857,794. The net income of this entire group was $1,411,647,483. The companies engaged in metal manufacture were subdivided as follows: Iron and steel smelting, 110 companies; foundries and rolling mills, 2,719 companies; agricultural machinery, steam appliances, construction machinery, 1,750 companies; metal-working and paper-making machinery, heavy ordnance and rolling stock, 801 companies; general electric machinery, refrigerating machinery, stationary and marine engines, 703 companies; motor vehicles and airplanes, 858 companies; boot and shoe machinery, typewriters, gas and electrical fixtures, 816 companies; metal furniture, ornamental ironwork, sewing machines, 208 companies; machine tools, gages, firearms, hardware and cutlery, 1,004 companies; all other metal products, 4,786 companies; base-metal smelting, 711 companies; precious-metal smelting and refining, 665 companies.

Steam Consumer Staying Out of Coal Market

The advent of cold weather and the usual seasonal household demand will increase the need for domestic fuels. According to *Coal Age*, this market is not yet in full swing, but domestic quotations for Oct. 4 have all the earmarks of further increases as the short supply will be accentuated by orders placed as a substitute for hard coal. This demand will fall largely on producing districts not usually called upon to furnish coal for domestic use, but will doubtless also lead to emergency shipments eastward of high-grade domestic from fields west of the Alleghenies.

The steam consumer is purposely staying out of the market and is taking little coal aside from current needs. In the Middle West he is able to obtain this tonnage by picking up bargain lots which are still sent in on consignment, often being sold under pressure of heavy demurrage. Screenings have been selling on a par with mine-run, but with the apathetic steam market and the better domestic call more operators are screening their output, and this is fast softening the resultant sizes.

Estimates Copper in Building Totaled 150,000.000 Lb.

The Copper and Brass Research Association estimates the total consumption of copper in the building industry this year at 150,000,000 lb., comprising copper, brass and bronze in the form of sheets, piping, hardware, lighting fixtures, wire, etc.

This is an increase of 100,000,000 lb. as compared with 1921, of 96,000,000 lb. as compared with 1920, and of 73,000,000 lb. as compared with 1919, in which years the amount of copper used in the building industry varied between 4 and 6 per cent of the total copper consumption of the United States.

The association also estimates that 118,000,000 lb. of copper will be used

this year in roofing and sheet metal work, 17,000,000 lb. in plumbing, 11,000,000 lb. for lighting fixtures, etc., and 4,000,000 lb. in hardware.

The potential market for copper and brass in the building industry on the basis of this year's construction is estimated at 650,000,000 lb.

Fixture Thread Hearings to Be Held in Near Future

Public hearings by the National Screw Thread Commission in the matter of threads for electric fittings and fixtures will be held in the near future at Pittsburgh and Chicago. It is hoped that these hearings can be called before the end of October. A third hearing is contemplated at which those concerned with pipe-casing threads may acquaint the commission with their views. That hearing will be held at some point in the oil region. Neither the place nor the date has been determined upon as yet.

Loose-Leaf Commerce Reports Wanted as Aid to Sales

Loose-leaf publications of commerce reports are finding much favor from those carrying on foreign trade in electrical products. That the industry is desirous of having its circulars of information in this form is seen in a recent survey made by an association of New York City. It is said that the first suggestion was made to the Department of Commerce by J. Walter Drake and G. F. Bauer, chairman and secretary of the foreign trade committee, and Gordon Lee, chief of the United States Automobile Division.

"The change, if made," said Mr. Drake, "will be of great advantage to business men. Valuable information, now perishable in many instances, could readily be stored for future use in devising foreign sales campaigns that, based on facts, would be directly reflected in domestic prosperity."

Prevailing Conditions Affecting Cost and Volume

Volume of Business Shows Large Gain.—Settlement of end-of-quarter and end-of-month obligations during the week ended Oct. 4 accounts largely for the increase in the volume of business from $8,220,000,000 for the week ended Sept. 27 to $9,697,000,000 for the week under review. Larger figures are reported for all the leading centers except Detroit.

Business Continues Upward Trend.—The general trend of business in the United States during the last week, with few exceptions, continued in the direction of improvement, according to *Dun's Review*. "Recent weeks have brought practically an advance, following a seasonal lull in different trades and a setback in some industries through labor troubles, and sentiment is unmistakably stronger."

Coal Shipments Improve Quickly.—Loading of anthracite coal on Tuesday, Oct. 3, totaled 6,056 cars, according to reports received from the rail carriers by the Car Service Division of the American Railway Association. This was an increase of 224 cars over the day before. It also exceeded the daily average for October last year by 203 cars and the daily average for October, 1920, by 146 cars.

Greatest Car Loading in History.—The number of cars loaded with revenue freight on American railroads during the week which ended on Sept. 23 was 96 per cent of the greatest loading in history, which was during the week of Oct. 1, 1920 according to reports just received by the Car Service Division of the American Railway Association.

Failures Increase in South. — Last week a large increase in the South and a smaller one in the Pacific section have more than offset the decreases in the other two sections of the United States. Failures reported to R. G. Dun & Company totaled 383, compared with 380 for the week before last. A year ago the total was 353. A decline, however, is shown in the number of defaults with liabilities of more than $5,000 in each case. Last week's figure is 209, which is 54.5 per cent of the total, while in the preceding week the number was 214 and the proportion 56.3 per cent, the same proportion held by the 199 similar insolvencies in the week a year ago.

Expects Peak Car Shortage Will Come Next Month

Opinions in the industries regarding the imminence of a shortage of coal because of a lack of transportation vary. One large coal dealer has been quoted as believing that the peak of the car shortage will be reached in the middle of November. He explained that precedence has been given to coal shipments since the resumption of mining and that this condition could not be maintained indefinitely.

Electrical Exports Declined During August

A further decline in the exports of electrical machinery and apparatus was registered during August, the returns to the Bureau of Foreign and Domestic Commerce show. In that month the value of electrical exports was $3,928,344. This is a falling off of more than $400,000 as compared with July and a decline of over $2,000,000 as compared with the value of exports in August, 1921. The detailed figures are as follows:

ELECTRICAL EXPORTS FOR AUGUST, 1922, COMPARED WITH CORRESPONDING PERIOD A YEAR AGO

	August, 1921	August, 1922
	Value	
Electrical glassware, except for lighting	.....	$14,051
Electrical porcelain	.....	87,171
Carbons for electric lighting, electrodes and batteries	$27,110	130,802
Insulated wire and cable (iron and steel)	.....	27,508
Other manufactures of aluminum	183,065	105,411
Copper wire (bare)	35,918	99,423
Insulated copper wire and cable	305,829	117,841
Generators:		
Direct-current—		
Under 500 kw.	.....	45,670
500 kw. and over	.....	280,402
Alternating-current—		
Under 2,000 kw.	.....	1,339
2,000 kw. and over	.....	86,430
Accessories and parts of generators	.....	15,836
Self-contained lighting outfits	.....	52,622
Batteries—		
Primary—dry	.....	79,787
Primary—wet	.....	1,862
Storage	.....	122,799
Transforming or converting apparatus:		
Power transformers	.....	334,931
Other transformers	.....	25,777
Rectifiers	.....	4,777
Condensers, double-current and motor generators, dynamotors, synchronous and other converters	.....	279,139
Transmission and distribution apparatus:		
Switchboards and panelboards, except telephone	.....	222,222
Switches and circuit breakers	.....	212,886
Fuses and fuse plugs	.....	11,315
Watt-hour and other measuring meters	.....	23,916
Volt, watt and ampere meters and other recording, indicating and testing apparatus	.....	55,008
Lightning arresters, choke coils, reactors and other protective devices	.....	69,665
Motors, starters and controllers:		
Motors, under 1 hp.	.....	62,238
Stationary motors—		
1 to 200 hp.	.....	114,123
Over 200 hp.	.....	24,253
Railway motors	.....	33,505
Electric locomotives	242,362	.....
Railway	.....	.....
Mining and industrial	.....	62
Other motors	959,773	38
Rheostats, controllers and other starting and controlling equipment	64,456	89,626
Accessories and parts for motors	.....	88,248
Electric appliances:		
Electric fans	32,233	36,036
Electric lamps—		
Arc	184	3,363
Incandescent—		
Carbon-filament	8,051	1,959
Metal-filament	86,746	80,367
Other electric lamps	.....	8,339
Flashlights	.....	17,568
Searchlights and projectors	.....	8,660
Motor-driven household devices	.....	38,963
Domestic heating and cooking devices	69,660	30,164
Industrial electric furnaces and ovens	.....	25,914
Therapeutic apparatus, x-ray machines, galvanic and faradic batteries, etc.	.....	43,981
Signal and communication devices:		
Radio and wireless apparatus	.....	188,670
Telegraph apparatus	.....	20,839
Telephone apparatus, including switchboards	.....	261,385
Police, fire and burglar alarms	.....	1,432
Railway signals, switches and attachments	.....	20,274
Bells, buzzers and annunciators	.....	6,258
Other electric apparatus:		
Spark plugs, magnetos and other ignition apparatus	71,145	92,732
Insulating material	.....	.....
Metal conduit, outlet and switch boxes	.....	26,579
Sockets, outlets and receptacles	.....	51,338
Other wiring supplies and fixtures	69,386	105,091
Other electrical apparatus not elsewhere specified	2,098,969	425,178
Electrical machinery and apparatus (total)	$5,966,912	$3,928,344

The Metal Market

Copper Firm—Trade Would Not Have Been Strong if Production Had Been Normal

A firm tone prevails in the copper market. The price is unchanged at 14 cents per pound for electrolytic, delivered, throughout the remainder of the year and through January of 1922. It is said in the trade that buying would not have proved strong enough to have maintained prices had the supply of labor been normal. There would have been overproduction and the market could not have held. In former times three-quarters of the workmen in mines and smelters were foreigners, but so strict have the immigration laws become that now the percentage lies the other way and only one-quarter are foreigners.

Demand remains high from both wire and brass mills, and consumers continue insistent upon prompt shipments on contracts. As soon as the rail congestion begins to be straightened out better buying is expected. In the meantime consumers are waiting for improvement in fuel stocks before buying very much in advance of requirements. Stocks of metal at the mills are reported as small.

The antimony market continues quiet, there being only a limited demand for odd-lot quantities at attractive prices. Seven cents per pound continues to be quoted by the larger interests in carload lots. This price, however, can be shaded in the outside market by at least ¼ cent a pound.

No new business has been reported in manganese ore. Most buyers readily admit that the tariff will not stop large importations of manganese ore, which is absolutely necessary to make a high-grade ferro-manganese, as the domestic ore is of too low grade for that purpose. Considerable business has been done in ferro-manganese.

Prior to and immediately following the passage of the tariff bill very considerable business in tungsten ores was done, causing the price to go up to $7.50 and $7.75 per unit for good-grade ore. Profit taking on the part of those who have bought the tungsten in at low figures caused, however, a slight recession, and prices again temporarily touched $7 to $7.50 per unit, according to the quality of the ore. It would appear that profit taking has now come to an end, and it is doubtful whether any large quantity of ore can be picked up today under $7.50 to $8 per unit. The statistical situation of tungsten ore seems to be favorable for higher prices.

Steel mills and furnaces are receiving a larger percentage of coal by barge, and preparations are being made to forward heavy shipments to the south by water. Carnegie Steel is operating thirty-six of its forty-eight blast furnaces. A number of plants are on an 80-per cent basis. Sheet and tin plate mills are close to normal. In the Wheeling district schedules were advanced slightly last week.

The Week in Trade

Prices When Quoted Are Those Reported at the Opening of Business on Monday of This Week for Points West of the Mississippi River and on Tuesday for All Eastern Points

IMPROVEMENT in the electrical trade continues, according to reports received from all important centers of the United States. Broadcasting of the "world series" baseball games has caused increased interest in radio apparatus, and sales for the week show an improvement. Spotty stocks of conduit are noted, and prices are continuing upward in the Eastern districts. Holiday buying of appliances has started, and extensive sales are reported by the jobbers.

New York

Fixture Demand Increasing—Motor Prices Steady—Stocks of Smaller Size Conduit Uneven

Jobbers report appliances to be moving in better volume than for some months past. Heater stocks are being rapidly used up, and there is some talk in the market of further stiffening of prices. Schedule material is selling actively and construction material sales remain steady.

Fixtures.—Increasing demand for all grades. Stocks are fair and prices steady. Some activity in glass-decorated types was reported last week.

Motors.—Smaller sizes are selling best at the present time. Prices are steady and stocks are much lower than three weeks ago.

Conduit.—Stocks of the smaller sizes are uneven. Some deliveries are longer than normal. Prices are on the upward trend.

Chicago

Lighting Fixtures Active—Cleaners and Washers Moving Well—Wiring-Material Demand Steady

Electrical trade is continuing its steady movement. The call for lighting fixtures is quite active. Jobbers attribute this to the people's desire to complete and rehabilitate their lighting system before the evenings grow much longer. Demand for wiring materials is a little varied, but the amount sold is encouraging. Conduit is still spotted. Dealers report good sales on washing machines and vacuum cleaners.

Conduit.—The conduit situation has changed but slightly, since the demand is active and stocks are varied. The freight embargo from the East on conduit, effective Oct. 12, will not help the situation. The ½-in. black pipe sells around $55 per 1,000-ft. in 5,000-ft. lots.

Wire.—Movement on rubber-covered wire is still steady. The No. 14 is available is 5,000-ft. lots for $6.25 and $6.30 per 1,000 ft. Stocks are normal. The demand for bare and weatherproof remains unchanged.

High-Tension Equipment — Healthy action on this material is reported by manufacturers. One company shipped an order for 300 25,000-volt fuses to New Zealand and an order for 69,000-volt fuse mountings and fuses to a utility in Pensylvania.

Cleaners and Washers. — Sales on these appliances are greater than this time last year. One dealer reports an active volume of business which is due to his sales campaigns. Stocks are normal.

Lighting Fixtures. — Business on household lighting fixtures has been very satisfactory to most dealers. The medium-priced grade of fixture is moving the best. Prices increased about 10 per cent Oct. 1 on glassware and fixtures.

Boston

World Series Broadcasting Stimulates Radio Sales—Heater Buying Is Record-Breaking

Improvement in trade continues, demand being well distributed. Building contracts in New England for the week ended Oct. 3 totaled $8,210,500 against $3,696,300 for the same week last year. The Boston Edison company has decided to begin its new Weymouth station, with an initial installation of 60,000 kw. General business is better throughout New England, though textiles have not become normal and manufacturing in general is slowly returning to prosperity. Jobbers of electrical supplies are very busy and shortages in steel products are marked.

Radio Apparatus.—The public is back in the market, and the baseball "world series" broadcasting stimulated demand sharply last week. Stocks are ample and prices are weak in some quarters owing to overaccumulation.

Wire.—Rubber-covered No. 14 is active at $6.25 per 1,000 ft. in 5,000-ft. lots. Weatherproof is moving well on a 16.5-cent to 17-cent base. Six to seven weeks' delivery is quoted by a large New England manufacturer, but jobbers' stocks are satisfactory for the present.

Rigid Conduit.—Stocks are spotty, with local gaps in ½-in. and ¾-in. sizes. Fittings are plentiful. The embargo in the Pittsfield district is greatly hampering deliveries. Prices are firm.

Motors. — Gradual improvement is evident in both inquiries and sales. The recent trend toward fuel-oil installations has resulted in placing many ¾-hp. alternating-current motors.

Market Conditions for Four Weeks Ended Oct. 7

	New York	Chicago	Boston	Atlanta	Cleveland	St. Louis	San Francisco	Salt Lake City-Denver	Portland-Seattle
Conduit	Active	Active	Steady	Active	Active	Steady	Steady	Steady	Active
Armored cable	Steady	Active	Steady	Steady	Steady	Steady	Active	Steady	Active
Wire	Steady	Steady	Active	Active	Active	Active	Steady	Active	Steady
Sockets	Steady	Steady	Steady	Steady	Steady	Steady	Steady	Slow	Active
Knobs	Steady	Active	Steady	Steady	Steady	Steady	Active	Steady	Active
Switches	Active	Active	Steady	Active	Steady	Steady	Steady	Slow	Steady
Hollow ware	Steady	Steady	Steady	Steady	Steady	Steady	Active	Active	Active
Lamps	Active	Active	Active	Steady	Active	Active	Steady	Active	Steady
Motors	Steady	Active	Active	Steady	Steady	Steady	Active	Steady	Steady
Refrigerators	Steady	Steady	Slow	Active	Slow	Steady	Steady	Steady	Steady
Soldering sets	Steady	Steady	Steady	Active	Steady	Steady	Steady	Steady	Steady
Washing machines	Slow	Steady	Active	Active	Active	Active	Slow	Active	Active
Vacuum cleaners	Steady	Steady	Active	Steady	Active	Steady	Slow	Active	Steady
Radio equipment	Active	Active	Active	Active	Active	Steady	Steady	Steady	Steady
Trend of prices	Up	Up	Up	Up	Up	Up	Firm	Up	Firm

Heaters.—The demand is so active that it is practically impossible to maintain stocks. Manufacturing facilities are still hard pressed, and the public is buying on a record-breaking scale.

Appliances.—Flatirons and cleaners are moving well. Portable lamps are selling somewhat better. Vigorous appliance sales effort by central stations is reacting to create a larger demand for house wiring.

Atlanta

Pole Movement Is Only Fair—Lamp Supplies Ample—Glass Insulators in Demand

A steady improvement of general conditions is apparent both in the cities and rural districts. Building continues very active with all previous records in Atlanta smashed by the month of August, when permits totaled $2,320,000. This brings a grand total of eight months up to $14,052,000 and reflects accurately the building activities in this city. Merchants report that marketing of crops is improving collections in country districts, but rural clients are still not inclined to take care of old indebtedness.

Poles.—Only fair movement is reported, with deliveries not so good as they might be. Prices continue to remain steady.

Pole-Line Hardware. — Satisfactory volume of sales is reported on the entire line in face of the 10 per cent price advance. Good stocks are on hand, but deliveries are somewhat slow.

Lamps.—The fall demand is in full swing, with retailers purchasing quite respectable stocks for fall trade. Ample supplies are in the territory.

Panelboards. — Building construction is stimulating this line and sales are brisk. Some delay is being experienced in receipt of factory shipments, due to rail conditions.

Insulators.—A continued fair movement of the porcelain types is to be noted, while glass types are in steady demand. Local stocks are in good shape and a noticeable improvement is apparent in deliveries.

Radio Equipment.—Sales in this line hold up excellently, while jobbers have good stocks on hand and report shipments satisfactory. Deliveries, however, are still somewhat delayed.

Salt Lake City

Warm Weather Retards Heater Demand—Lamp Sales Show Healthy Increase—Washers Slow

Retail selling is brightening in nearly all lines. Harvest money is circulating freely and farmers are better able this year to liquidate their obligations. Collections show a corresponding improvement.

Government statistics show that labor conditions are practically normal in the Intermountain region. Nonemployment has totally disappeared, and there is an actual labor shortage in certain lines. Building projects of all kinds are moving forward satisfactorily, the weather favoring outdoor construction.

Air Heaters—Retailers are stocking well, but consumer activity has scarcely begun. The weather continues warm, retarding demand. Jobbers' stocks are normal. An effort will be made to clean up old stocks. Selling price is 20 per cent below last year's quotations.

Lamps—Reductions amounting to 15 per cent apply to all popular sizes. Sales show a healthy increase, especially since the beginning of the fall school term.

Washing Machines—There is a decided let-down in demand. This is not considered the washer season. Stocks are good.

St. Louis

Radio Demand Is for Complete Sets—Further Increase in Conduit Is Reported

New construction of small houses, hospitals, schools, churches and society buildings, holiday purchasing and radio sales constitute the principal elements of demand. Business is characterized by gradually increasing prices, a large number of small orders and a very conservative buying policy. Dealers are becoming more appreciative of the jobbers' function of maintaining a reservoir of goods upon which they may draw, and jobbers are encouraging conservative buying and faster turnovers.

Radio.—Trade is picking up very encouragingly, and the dullness during the summer enabled jobbers to build up their stocks so that immediate delivery on most items can be given. Demand is shifting toward complete outfits, and the principal requirement is the set selling for $130 to $160.

Conduit. — A further increase in price was announced this week, the new quotations made by one jobber in 5,000-ft. lots being; ½-in. black, $55 per 1,000 ft.; ½-in. galvanized, $62 per 1,000 ft.; ¾-in. black, $70 per 1,000 ft.; ¾-in. galvanized, $76 per 1,000 ft. Demand is holding up well, but stocks are quite short. Deliveries have been made more difficult by freight embargoes.

Porcelain.—Prices continue upward. Knobs are now selling for around $15 per 1,000 in barrel lots. Stocks are in good condition to meet the demand, which is comparatively active.

Denver

Washing-Machine Business Spotty—Flatirons Selling Actively—Conduit Stock Depleted Materially

Increased bank clearings and a continued building boom reflect improvement in business in spite of transportation difficulties. The labor situation shows marked improvement, according to the government report. Electric business continues in good volume with increasing demand from outside territory, all jobbers reporting satisfactory business.

Radio.—Movement of high-priced sets and parts, especially amplifiers and loud speakers, is picking up. Distributors feel that the increase in the past few weeks evidences returning interest, and if broadcasting programs are stabilized holiday business in this line will prove good.

Washing Machines.—Spotty business is found throughout this territory. One of the largest jobbers reports a volume twice that of last year. September campaign by central stations has stimulated interest materially, according to dealers.

Appliances.—Flatirons, curling irons, radiant heaters and waffle irons in their respective order lead in the volume of sales.

Conduit.—The extensive local building program has depleted stocks materially. All jobbers report slow deliveries, presumably due to transportation difficulties. Prices on available stock have strengthened. All reserve stocks have been released.

Pole-line Hardware.—Two jobbers report increasing demand for materials on new transmission lines with business to date nearly double that anticipated earlier in the year. Continued extensions will absorb all surplus stocks if new shipments are not received in time.

San Francisco

Stocks in Good Shape—Improvement in Appliance Selling—Competition Affecting Marine Business

Local stocks are in good shape and show steady proportionate movement. These stock figures are kept comparatively high by reason of service competition. The usual fall shows are well attended, but the rank and file of electrical dealers are not so well represented as specialty appliance stores. Store business is reported to be in a fair condition.

Household Appliances. — Increasing importance of neighborhood stores and their more intelligent merchandising show better appliance results, especially when they divorce the dealer from the contractor. This seems to be the second stage of appliance merchandising.

Marine Material.—Nearly all work is carried on by special firms. These without exception report that business is concentrated at times but decreasing from its previous volume. The reason generally given is that fierce competition has caused steamer companies to instruct their crews to cut out all except "life and death" repairs. However, ambitious plans insure future excellent business.

Schedule Material. — Manufacturers show tendency to eliminate protection and future delivery orders so that unfilled balances will be billed at the prices effective on date of shipment. Some manufacturers are urging better anticipation of demands to counter a threatened decrease in production.

Portland–Seattle

Jobbers Report Business in Excellent Shape—Advances Reported for Rubber-Covered Wire

Business for the past week in the Northwest continues to show improvement. Exports for September from Portland were greater than any month this year with the exception of June, and October promises to exceed the September record. Building throughout the Northwest is still active. For the first nine months of this year the valuation will exceed that for the same period of 1921 by at least 35 per cent.

Electrical jobbers report business to be in excellent shape. Building construction work and new development projects are both creating a heavy demand for material. Conduit shortage continues to be serious. Collections are very slow. The Portland district, however, reports a material improvement during the past month. Prices are stiffening, slight advances being reported on rubber-covered wire and porcelain products.

Convenience Outlet Boxes—The demand has been and continues to be very good. Galvanized boxes are largely replacing the black boxes. Octagonal boxes, in standard packages, are quoted at $18.20 per 100.

Activities of the Trade

Devoted to News of the
Manufacturer, Jobber, Agent, Contractor and Dealer, Including Important Orders and Contracts for Apparatus and Equipment

General Electric Orders Gain 42 per Cent

Orders received by the General Electric Company for the three months ended Sept. 30 have amounted to $58,914,620, an increase of 42 per cent over the similar period in 1921, according to a statement just made by President Gerard Swope.

For the nine months ended Sept. 30 orders were $176,171,194, or an increase of 30 per cent over the same period in 1921.

Ohio Electric & Controller Makes Sales Appointments

Mark C. Smith, formerly associated with the Westinghouse Electric & Manufacturing Company, Cleveland, has been appointed district sales manager of the motor department of the Ohio Electric & Controller Company, effective Oct. 1 Mr. Smith's office will be at 53 West Jackson Boulevard, Chicago.

Chicago Fixture Company Increases Force

The Chicago Lighting Fixture Company, 28 West Lake Street, Chicago, has been obliged to double its assembling force owing to the active demand for household fixtures. R. L. Groome, sales manager, stated to a representative of the *Electrical World* that sales on good-grade fixtures both in Chicago and the suburbs have proved very satisfactory. With the rush of orders for the past weeks Mr. Groome declared that his rest periods have been infrequent.

Although prices increased about 10 per cent Oct. 1 on glass and brassware, the demand for artistic and serviceable features has been very active. This is the natural result of the biggest building boom Chicago has ever known.

Apex Electrical Distributing Announces Changes

The Apex Electrical Distributing Company, Cleveland, has appointed the North Coast Electric Company as distributor for its products in the States of Oregon and Washington. The North Coast Company maintains houses at Seattle, Spokane and Portland, and it will distribute the complete line of the Apex company, consisting of the "Apex" electric suction cleaner, "Rotarex" electric clothes washer and "Rotarex" home double-roll ironer.

The company also announces that it has moved its Philadelphia office from the Perry Building to 204 Empire Building.

The H. C. Roberts Electric Supply Company, Philadelphia, has been appointed distributor for the products of the Apex company in the territory of eastern Pennsylvania, Delaware and southern New Jersey.

Binghamton Washing Machine Acquires 1900 Washer

The controlling interest in the 1900 Washer Company, Binghamton, N. Y., manufacturer of electrically operated washing machines, has been acquired by the Binghamton Washing Machine Corporation, organized under state laws with a capital of $800,000. The new owner will take immediate possession of the plant and purposes to increase the output. The purchasing firm is controlled by the Maynard H. Murch Company, Union National Bank Building, Cleveland, dealer in investment securities, and Walter S. Quinlan vice-president and secretary of this company, will be president of the new organization. T. W. Behan, formerly general manager of the 1900 Washer Company, will be vice-president, and Paul J. Bickel secretary.

English Radio Manufacturers Form Broadcasting Company

Formation of a broadcasting company by the six principal manufacturers of radio equipment in Great Britain in order to promote sales was announced last week by Frank Gill of London, European chief engineer of the International Western Electric Company and president-elect of the British Institution of Electrical Engineers, who has just arrived in this country. He said that stock ownership in the company will be available to any manufacturer of radio equipment in the British Isles. The company, he said, would have a capital of £100,000, and present plans call for the erection of stations at London, Birmingham, Manchester, Newcastle, Cardiff, Glasgow, Plymouth and Aberdeen.

Los Angeles Firm Puts M. F. Size in Charge of Appliance Sales

The Edison Electric Appliance Company, Los Angeles, announces the appointment of Mires F. Size, formerly with the Martin Electric Company, Denver, Colo., agent-jobber for the Edison Electric Appliance Company in Colorado, as a heavy-duty specialist and in charge of the heating-appliance campaign in southern California.

Radio Corporation Purchases $1,000,000 Home

Officials of the Radio Corporation of America announced last week that a contract had been entered into for the purchase of the White Oil Building in New York City for approximately $1,000,000. The building, in which already are some of the offices of the corporation, will be known as Radio House and will be the point from which all messages from and to the United States will be sent and received. In its announcement the company stated:

"No 64 Broad Street has come to be known in the radio world as the 'heart of worldwide wireless.' The building is within two blocks of the principal cable and telegraph forwarding offices and particularly near the Postal Telegraph Company's office, with which the Radio Corporation has recently entered into an traffic arrangement whereby the Postal company collects and distributes transatlantic radiograms from and to all points in the United States."

Cutler-Hammer Company Opens Sales Office in Buffalo

In order to give greater attention to business in western New York and the Province of Ontario, a branch office has been opened by the New York office of the Cutler-Hammer Manufacturing Company, manufacturer of electric motor controllers, clutches, brakes and other electrical equipment. This office is at 358 Ellicott Square, Buffalo, N. Y., B. A. Hansen, formerly in New York, has been placed in charge.

Slogan Contest for $1,000 Started by Electric Truck Association

The electric truck industry is asking for a slogan with a reason. Men in that industry want a slogan not longer than ten words and have appropriated $1,000 to be paid in prizes as follows for the best slogans with reasons which are suggested: First prize, $500; second prize, $200; third prize, $100, and forty other prizes of $5 each.

According to the publicity literature which the Electric Motor Truck Association, New York City, is putting out, among the 4,362 electric trucks that were in use in New York City, Jan. 1, 1921, there were five trucks over twenty-three years old, seven over twenty years, twenty-five over eighteen years, thirty-three over seventeen years, 106 over fifteen years, 221 over twelve years, 980 over ten years, 1,580 over eight years, 2,448 over six years and 2,899 over five years. One of its bulletins further states: "Obnoxious odors are eliminated; there are 500 fewer parts to wear out; automatic panels make charging simple; 'electrics' reduce insurance costs 25 to 50 per cent; there is 2,000 miles greater guarantee on tires; there is no starting trouble or complicated mechanism; no frozen radiators with storage-battery trucks; the vehicle will deliver more packages at lower cost for each package; uses no energy when standing still; it is cleaner, and its cost for each mile, ton-mile or ton hauled is the lowest for any known motor truck."

Westinghouse Opens New Service Station at Johnstown, Pa.

Representatives of many industries and the Johnstown Chamber of Commerce attended the official opening of the Westinghouse Electric & Manufacturing Company's new service station at Johnstown, Pa., recently.

The guests were received by H. R. Larson, manager of the new station and, after an inspection tour of the plant, were entertained at a buffet luncheon. Addresses at the meeting following the luncheon were made by Mr. Larson, who presided; P. L. Carpenter, president of the Johnstown Chamber of Commerce, and H. H. Johnston, mining engineer of the Westinghouse company.

Mr. Carpenter, speaking in behalf of the Chamber of Commerce and business interests of Johnstown, thanked the Westinghouse officials for the establishment of the station. Mr. Johnston discussed the advantages in recent developments in the manufacture of electrical equipment for use in mines and industrial plants.

The station is housed in a two-story brick building and contains approximately 9,000 sq.ft. of floor space. The first floor contains all equipment necessary for repairs to electrical equipment and the second floor is to be used for storage purposes.

The establishment of the service station, which brings the Westinghouse company in closer contact with its customers in the large mining and industrial area centering in Johnstown, is considered a tribute to the rapid progress of industry in that district.

The Beacon Lamp Company, Peabody, Mass., has leased a building at Lowell and Foster Streets, heretofore occupied by the Peabody Thermometer Company, and will equip the structure for the manufacture of incandescent electric lamps.

The King Electric Manufacturing Company, Tonawanda, N. Y., will soon commence operations at its new plant at 1,671-5 Fillmore Avenue, Buffalo, N. Y., recently acquired from the Linde Air Products Company and used by that organization during the war as an experimental works. The King company will remove its Tonawanda factory to the new location, where a complete line of battery-charging equipment and automatic electric devices will be manufactured. A considerably increased working force will be employed.

The Westinghouse Lamp Company, Watsessing district, Bloomfield, N. J., will soon commence the construction of the first unit of its proposed plant additions, near Arlington Avenue, estimated to cost close to $70,000. Other units will be constructed in the near future.

The Wood-Reinecke Electric Company, Inc., 512 West Main Street, Louisville, distributor and jobber, has been changed to the Ohio Valley Electric Company, Inc. The address of the company remains the same. Since the death of Harry I. Wood, former president of the firm, and the acquiring of his interests by the present stockholders, the following officers have been elected: William Reinecke, president, and J. Louis Daeuble, vice-president and treasurer.

The Baldwin Locomotive Works, Philadelphia, announces that it has an order from the New York, New Haven & Hartford Railroad for five large electric locomotives.

The Safety Insulated Wire & Cable Company, 114 Liberty Street, New York City, has moved its offices in Boston from Post Office Square to 185 Devonshire Street.

The Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., is reported to be negotiating for the purchase of the plant of the Savage Arms Company at Sharon, Pa., to be used as a new branch plant.

The Wills Storage Battery Manufacturing Company, San Marcos, Tex., recently organized, has plans nearing completion for the erection of a new plant, 50 ft. x 100 ft., for the manufacture of batteries and battery parts.

The Electric Motor & Engineering Company, Canton, Ohio, switchboards, panelboards, steel switch boxes and motors, has recently booked a large order from the General Motors Company, Detroit, covering some lighting and power panels and main switchboards.

The Western Electric Company has awarded a contract to Barclay White & Company, 1713 Sansom Street, Philadelphia, for the erection of a five-story building, 60 ft. x 148 ft., at 910-14 Cherry Street, Philadelphia, estimated to cost about $200,000, to be used for a local headquarters and factory branch.

The United States Lighting & Heating Corporation, Niagara Falls, N. Y., manufacturer of lighting equipment, batteries, etc., has taken title to a tract of land at Oakland, Cal., totaling about two acres, to be used as a site for the construction of a branch plant. Plans will be prepared at an early date.

The Electric Gift Shop, 115 East Ohio Street, Indianapolis, distributor of labor-saving appliances, has changed its name to the Edison Electric Company, Inc. V. L. Jones is president.

The E. W. Ham Electric Company, Worcester, Mass., wholesaler of supplies, will be in its new quarters on Burnside Court after Nov. 1.

The Parr Electric Company, Inc. New York City, wholesaler and exporter of supplies, has recently filled several large marine orders.

Foreign Trade Notes

PROPOSED DEVELOPMENT ON THE RIVER BLAVET IN FRANCE.—A concession has been asked by the Société Générale d'Enterprises, Paris, the *Commerce Reports* states, for the construction of a hydro-electric plant in the Department of Morbihan, about 30 miles up the River Blavet from the city of Lorient. The total cost of the project is estimated at 28,000,000 francs. It is proposed that the sum of 2,000,000 francs each be contributed to the enterprise by the two departments (Morbihan and Côtes-du-Nord) which are primarily interested in seeing this source of power developed.

PROPOSED IMROVEMENTS TO THE HYDRO-ELECTRIC PLANT AT NAPLES, ITALY.—Improvements to the water supply and hydro-electric plant of Naples, Italy, are under consideration, according to *Commerce Reports*, involving the utilization of the fountain of Acellica, which has a capacity of 320 liters and 1,200 liters per second and which is to supply water for domestic purposes and electricity for the provinces of Avellino and Benevento. The cost is estimated at 600,000 lire, but as yet no authorization for the work has been obtained.

HYDRO-ELECTRIC PLANT IN PHILIPPINE ISLANDS UNDER CONSIDERATION.—In connection with plans to secure water for Manila from the Angat irrigation system, investigations are being made by officials and engineers looking into the possibility of utilizing the falls of the irrigation dam on the Angat River in Bulacan to generate electricity. The minimum cost is estimated at $7,500,000.

Foreign Trade Opportunities

Following are listed opportunities to enter foreign markets. Where the item is numbered further information can be obtained from the Bureau of Foreign and Domestic Commerce, Washington, by mentioning the number.

An agency is desired in Australia (No. 3,809 for motors and generators, power circuit 230-460 volts, 50 cycles, alternating current; motors and generators, car lighting and starting; accumulators and parts.

Correspondence is desired in Indo-China (No. 3,849) with manufacturers of portable and stationary ceiling electric fans for alternating current (single phase), 120 volts, 50 cycles, and for direct current, 220 volts.

An agency is desired in India (No. 3,863) for electrical goods and accessories.

An agency is desired in New Zealand (No. 3,865) for motor accessories, electrical gear (general).

New Apparatus and Publications

LOUD SPEAKER AND VARIOMETER.—The Missouri Radio Corporation, St. Louis, is distributing descriptive circulars of its new loud speaker and variometer.

AUTOMATIC TEMPERATURE CONTROL.—The Brown Instrument Company, Philadelphia, has issued catalog 85 on the automatic control of temperatures through Brown indicating and recording instruments.

RADIO EQUIPMENT.—The Automatic Electric Company, 945 West Van Buren Street, Chicago, has added a new radio head set to its regular line of telephone equipment.

ELECTRO-MEDICAL APPARATUS.—The Bleadon-Dun Company, 213-17 South Peoria Street, Chicago, is manufacturing a new type C "Violetta."

ELECTRIC HUMIDIFIER.—The Ingersol Electrical Products Company, 109 West Austin Avenue, Chicago, is distributing a circular describing an electric humidifier which operates on either alternating or direct current.

STOKERS.—The Green Engineering Company, East Chicago, Ind., has issued a seventy-one-page book which gives a history of its stokers and also contains engineering data.

DEMAND METER.—Bulletin No. 46,108 issued by the General Electric Company, Schenectady, N. Y., describes its type M-4 demand meter, designed for use in combination with a watt-hour meter to indicate maximum demand.

OIL REFINERY APPARATUS.—The Griscom-Russell Company, 90 West Street, New York City, is distributing bulletin No. 910, covering its "Multiwhirl" and "G-R Vaneflo" coolers, exchangers and condensers for oil refineries.

MECHANICAL STOKERS.—"Cutting the Cost of Producing Steam" is the title of bulletin No. 230 issued by the Detroit Stoker Company, Detroit, which describes the Detroit single-retort underfeed stokers.

RESISTANCE MEASURING INSTRUMENTS.—Herman H. Sticht & Company, 15 Park Row, New York City, has issued Bulletin No. 115, covering the "Standco" megohmer, model "D," for measuring and testing voltages.

SAFETY SWITCHES.—The Trumbull Electric Manufacturing Company, Plainville, Conn., is distributing bulletin No. 4, covering its entire line of safety and externally operated switches. This bulletin is published in two forms, one a pocket edition and the other a loose-leaf form punched to fit jobbers' data book.

DRY BATTERY.—The National Carbon Company, Thompson Avenue and Orton Street, Long Island City, has recently brought out a new steel-case "Columbia" hot-shot battery, No. 1,461.

OIL CIRCUIT BREAKERS.—The Condit Electrical Manufacturing Company, South Boston, Mass., is distributing bulletins No. 450 and No. 452, describing its two new oil circuit breakers, known as types D-18 and D-22, for central-station and industrial use.

OUTLET BOXES AND COVERS.—The National Metal Molding Company has issued catalog No. 250, covering the "National" outlet boxes and covers, concrete boxes, switch boxes, cast cable boxes, etc.

RADIO TRANSFORMERS.—The Standard Transformer Company, Warren, Ohio, has developed several new types of radio transformers, including audio frequency amplifier, filament heating, power and two bell-ringing types.

LINE-SHAFTING EQUIPMENT.—The Medart Company, Potomac and De Kalb Streets, St. Louis, has issued catalog No. 43, covering its line-shafting equipment.

SMALL STEAM TURBINES.—The Kerr Turbine Company, Wellsville, N. Y., has developed a new small steam turbine for either generator or mechanical drive. It is made in capacities to generate from 500 watts to 2,000 watts or to furnish from 1 hp. to 5 hp. for mechanical drive.

SWITCHES AND FITTINGS.—Bulletin No. 60 issued by the Square D Company, Detroit, describes and illustrates its various types of standardized switches and fittings.

SMALL MOTORS.—The Bodine Electric Company, Ohio Street and Oakley Avenue, Chicago, has issued a small booklet covering the various types of the "Bodine" fractional-horsepower motors.

PRECISION INSTRUMENT.—The Norma Company of America, Anable Avenue, Long Island City, N. Y., is distributing a booklet describing its "minimeter," a precision measuring instrument, which makes possible measurements to one ten-thousandt of an inch in the manufacture of machines.

New Incorporations

THE SYLVATUS (VA.) LIGHT & POWER COMPANY has been incorporated with a capital stock of $10,000. G. W. Lewis is president and I. Lee Gray secretary.

THE FRANKLIN (MO.) ELECTRIC COMPANY has been incorporated with a capital stock of $20,000 by B. E. Perkinson, John Rogers and R. E. Boon.

THE AMHERST (WIS.) ELECTRIC COMPANY has been incorporated by A. G. Kernin, W. H. Knodler and Charles Simpson, Mosinee, Wis. The company is capitalized at $35,000 and proposes to furnish electricity for lamps and motors in Amherst.

THE STRATFORD (WIS.) LIGHT & POWER COMPANY has been incorporated with a capital stock of $12,000 to supply electricity in Stratford. The incorporators are Herman Langer, F. A. Semmulhack and Theodore W. Hoffman.

Construction News

Projects, Plans, Bids and Contracts, Contemplated or Under Way

New England States

AUBURN, ME.—The Board of Water Commissioners is planning to install an electrically operated pumping plant, to cost about $125,000.

MACHIAS, ME.—The Eastern Development Company, recently organized, will take over the property and holdings of the Washington County Light & Power Company. E. C. Ryder, Bangor, is president.

BOSTON, MASS.—The Board of Works will build a power plant at 750 Albany Street for municipal service, to cost about $25,000.

BOSTON, MASS.—Work will begin at once by the Edison Electric Illuminating Company of Boston on the erection of a new electric generating station in Weymouth. The initial installation, it is understood, will include two generating units of 30,000 kw. each. Stone & Webster, Inc., Boston, will design and build the plant in collaboration with the company's engineers. The work will be under the supervision of E. I. Moultrop of the Edison company.

Middle Atlantic States

COHOES, N. Y.—Contract has been let by the Board of Public Works, Albany, to the Brown-Lowe-Law Company, Schenectady, for the construction of a power house at Cohoes, to be used in connection with the State Barge Canal.

NEW YORK, N. Y.—The New York Edison Company has awarded a general contract to Charles K. Hedden, 342 Madison Avenue, for the construction of a three-story and basement substation, 44 ft. x 120 ft., at 27-29 Bridge Street.

NEW YORK, N. Y.—The New York Edison Company will erect a transformer station, 20 ft. x 100 ft., at 227 East Fifty-first Street, to cost about $200,000.

WHITE PLAINS, N. Y.—The New York Telephone Company will erect an automobile service and repair works on White Plains Avenue, to cost about $200,000. McKenzie, Voorhees & Gmelin, 432 Madison Avenue, New York City, are architects.

CAMDEN, N. J.—The lighting committee of the City Council has recommended substituting new street lamps for the arc lamps now in use. The Public Service Electric Company furnishes the street-lighting service.

EAST MILLSTONE, N. J.—Frederick Bascom contemplates the rebuilding of the power house and a portion of his milling plant, destroyed by fire, Oct. 1, causing a loss of about $50,000.

MORRISTOWN, N. J.—The Morris & Somerset Electric Company has been granted permission to erect a transmission line to Livingston and Millburn Townships, to cost $30,000.

TRENTON, N. J.—The Chamber of Commerce is considering plans for the installation of an improved street-lighting system in the business district.

CHAMBERSBURG, PA.—J. Crowe, Hartman Building, York, architect, is preparing plans for the construction of a power house and cold-storage plant here. The owner's name will be announced at an early date, when bids will be called.

McKEE'S ROCKS, PA.—A one-story power house, 30 ft. x 40 ft., will be erected in connection with the proposed new plant of the Cheseborough Manufacturing Company, 17 State Street, New York City, to cost about $750,000.

MINERSVILLE, PA.—The Pine Hill Collieries Company contemplates improvements to its properties, including the installation of electrical and mechanical equipment.

MOUNT CARMEL, PA.—The Council has approved plans for the installation of an ornamental lighting system on Fifth, Oak and Third Streets.

OAKS, PA.—Steps have been taken by the Oaks Improvement Association to secure an electric street-lighting system for Oaks. It is proposed to ask the Counties

Gas & Electric Company, Norristown, to furnish the service.

BALTIMORE, MD.—Bids will be received by the Board of Awards, City Hall, until Oct. 18 for 200,000 duct-feet of four-way and 100,000 duct-feet of six-way, multiple vitrified-clay conduit for the city electrical commission. Charles F. Goob is chief engineer.

HAGERSTOWN, MD.—Plans for the proposed municipal electric light plant have been submitted to the City Council by Millard Osborne, Philadelphia, consulting engineer. The plant will be erected on the Antietam Creek, near Grossnickle's Mill. The cost is estimated at about $400,000. A bond issue of $300,000 which has been approved by the voters is available.

KITZMILLERSVILLE, MD.—The Public Service Commission has authorized the West Maryland Power Company to furnish electricity in Kitzmillersville.

FAIRMONT, W. VA.—Arrangements have been made by the Brady-Warner Coal Corporation for a bond issue of $1,000,000, the proceeds to be used for extensions, including the installation of new mining machinery, electric equipment, etc.

NORFOLK, VA.—Steps have been taken by the Monticello Avenue Improvement League for the installation of an ornamental lighting system on that thoroughfare.

PORTSMOUTH, VA.—Isaac Fass, Inc., plans for the complete electrification of its ice and cold-storage plant. A substation will be erected.

RADFORD, VA.—Improvements are contemplated to the municipal electric light plant, to cost about $20,000.

RICHMOND, VA.—The Virginia Railway & Power Company has issued $1,250,000 in bonds, part of the proceeds to be used for extensions and improvements.

WASHINGTON, D. C.—Bids will be received by the purchasing agent, Post-Office Department, until Oct. 16 for 4,000 sets commutator wire assemblies.

North Central States

DETROIT, MICH.—The Public Lighting Commission has engaged Smith, Hinchman & Grylls, architects and engineers, Washington Arcade, Detroit, to prepare plans for a municipal electric power plant to have an ultimate capacity of 150,000 kva. The initial installation will include four units of 25,000 kva. each. The proposed plant will supply electricity for lighting the public buildings, streets, waterworks and sewage-pumping stations and the street railway system. Bids will be taken on equipment, including boilers, stokers, turbines and condensers and economizers, as soon as specifications are prepared.

GIRARD, OHIO.—Negotiations are under way between the City Council and the Pennsylvania-Ohio Power & Light Company for the installation of a new street-lighting system.

STEUBENVILLE, OHIO.—Plans are under way, it is reported, by the Pennsylvania-Ohio Power & Light Company, Youngstown, for the construction of a large power station on the Ohio River, near Steubenville, to supply electricity to the Youngstown industrial district, running as far north as Warren. The cost of the plant and transmission system is estimated at $15,000,000.

TOLEDO, OHIO.—The National Supply Company, 136 Huron Street, will build a one-story addition to its power plant, 24 ft. x 70 ft.

ZANESVILLE, OHIO.—The Ohio Power Company, Newark, a subsidiary of the American Gas & Electric Company, is reported to be contemplating the construction of a large power plant near Zanesville, to cost between $15,000,000 and $20,000,000. It will be connected up with the Newark and Windsor plants.

NEWPORT, KY.—Bids will be received by the Board of Commissioners, City Hall, until Nov. 14 for furnishing and erecting steam and electrically driven deep-well pumping machinery of 6,000,000 gal. capacity in the pumping station of the Newport waterworks. George Hornung, Wool-Sack Building, Newport, is consulting engineer.

PIKEVILLE, KY.—The Pike Light & Power Company contemplates extensions and improvements to its plant.

SOMERSET, KY.—The Parker Electric Mills, Ann Arbor, Mich., will build a hydro-electric plant in connection with a flour mill to be erected here, to cost about $500,000. The Associated Engineering Company, Somerset, is engineer.

HOPE, IND.—The Hope Light & Power Company, recently organized, is negotiating for the purchase of the local lines of the Porter Light & Power Company. Extensions and improvements will be made.

INDIANAPOLIS, IND.—The Merchants' Heat & Light Company has petitioned the Public Service Commission for authority to issue $118,000 in capital stock and $356,500 in bonds. Of the proceeds $91,333 will be used for extensions to the distribution system, $85,000 for new turbines, $70,000 for new transmission lines, and from $19,000 to $31,000 for equipment for increasing voltages, etc.

LAPORTE, IND.—Extensions and improvements are contemplated to the municipal waterworks system, including the installation of pumping equipment, etc., to cost about $125,000.

LAKE BLUFF, ILL.—The Public Service Company of Northern Illinois will build a transmission line from Evanston to Lake Bluff.

EAGLE RIVER, WIS.—Arrangements have been completed to erect a 4-mile extension to the municipal transmission line to furnish electrical service to the nearby summer resorts near Eagle River. Plans are also under consideration to erect an extension west of the power dam in the spring.

MILWAUKEE, WIS.—The Mullaney Fuel Company, 139 Sixth Street, will build a one-story addition to its power house.

MILWAUKEE, WIS.—The property of the Oostburg (Wis.) Heat & Power Company, the light and power lines of the Cedar Grove (Wis.) Telephone Company and the plant and property of the Belgium (Wis.) Electric Light & Power Company have been sold to the Badger Public Service Company, 1127 First Wisconsin National Bank Building, Milwaukee. The company will erect a transmission between the above towns and will be in the market for material and supplies for same. W. N. Albertson is president and general manager of the Badger company.

OSHKOSH, WIS.—The Wisconsin Public Service Company has issued $5,495,000 in bonds, part of the proceeds to be used for extensions and improvements.

PLATTEVILLE, WIS.—Construction will be commenced at once on a one-story addition, 48 ft. x 62 ft., to the municipal power plant.

PLYMOUTH, WIS.—The Phenix Cheese Company contemplates the purchase of a 30-ton artificial ice machine, a steam generating unit, two 150-hp. boilers and other equipment for its cold-storage warehouse. The Singer-Perlstein Company, 9 South Clinton Street, Chicago, is engineer.

RHINELANDER, WIS.—A new electric light plant will be installed in the local amusement park to replace the present plant.

WAUKESHA, WIS.—The installation of an ornamental lighting system in the downtown section is under consideration by the Council.

WEST ALLIS, WIS.—The City Council has authorized the installation of 100-cp. lamps at the principal street intersections throughout the city. The lamps will be installed by the Milwaukee Electric Railway & Light Company.

ELKADER, IOWA.—The electric plant of the Elkader Light & Power Company has been purchased by business men of Elkader, Garnavillo, Guttenberg, Littleport, St. Olaf and Colesburg and will hereafter be known as the Turkey River Development Company. The new company proposes to raise the present dam 4 ft. and will also build another dam to double the output of the plant, which will be distributed in neighboring towns.

ORANGE CITY, IOWA.—Bonds to the amount of $45,000 have been voted for the construction of a municipal electric light plant.

CAPE GIRARDEAU, MO.—Plans are under consideration by the Missouri Public Utilities Company to erect a transmission system to supply electricity from its central power plants in Cape Girardeau and Poplar Bluff to towns in southeast Missouri. The first lines to be erected will connect the system at Poplar Bluff with the local plant. Both of the power plants will be enlarged.

HIGGINSVILLE, MO.—The Council is considering the installation of an ornamental lighting system in the business district.

KANSAS CITY, MO.—The City Council is planning to install electric lamps in Swope Park and the main boulevard approaches.

KLONDIKE, MO.—The Tavern Rock Mining Company plans to rebuild its power house, recently destroyed by fire.

NEWBURG, MO.—F. W. Shaw, Rolla, plans for the construction of an electric plant to furnish electricity in Newburg.

ST. LOUIS, MO.—The McKelvey Construction Company will install an electric street-lighting system in Pennsylvania Park section, which is being developed for residential purposes.

SEWARD, NEB.—Contract has been awarded to the Central Bridge & Construction Company, Wahoo, Neb., for the construction of a new power house for the municipal electric plant, and for an ornamental lighting system on principal thoroughfares.

Southern States

CHARLOTTE, N. C.—The Southern Power Company will build two new large steam-driven electric generating plants. One of the stations (of 40,000 hp. capacity) will be located at Mountain Island, where the company is now building a large hydro-electric plant, and the other (of 20,000 hp. capacity) at Eno, where it already has a steam plant. Contracts for machinery, it is understood, have been awarded. The cost of the combined plants is estimated at about $2,000,000.

MOUNT AIRY, N. C.—The Appalachian Power Company, Bluefield, W. Va., is reported to be considering the erection of a transmission line from Bluefield to Mount Airy.

WILMINGTON, N. C.—The City Council has entered into a contract with the Tidewater Power Company to furnish electricity to operate the pumping plant of the waterworks system.

HICKORY GROVE, S. C.—Steps have been taken by local business men to erect an electric transmission line from Ninety-six Islands to Hickory Grove. The cost is estimated at $20,000.

ADEL, GA.—C. W. Carter contemplates rebuilding his lumber mill and power house, recently destroyed by fire, causing a loss of about $35,000.

COMMERCE, GA.—The City Council has granted the Georgia Railway & Light Company, Atlanta, a franchise to supply electricity for light, heat, power, etc., in excess of 50 hp. in Commerce.

DAYTONA, FLA.—The Daytona Public Service Company has issued $600,000 in bonds, part of the proceeds to be used for extensions and improvements.

JACKSONVILLE, FLA.—The municipal transmission system will be extended to Norwood and Panama Park.

JACKSONVILLE, FLA.—Plans are being considered for the construction of a hydro-electric plant on the St. Mary's River for service at the waterworks. A transmission line, 25 miles in length, will also be erected.

YBOR CITY, FLA.—The Business Men's Association is considering extensions to the ornamental lighting system.

KNOXVILLE, TENN.—The Knoxville Railway & Light Company has appropriated $250,000 for extensions and improvements to its system.

BIRMINGHAM, ALA.—Plans are under way for extensions and improvements in the municipal electric plant at North Birmingham.

NEWTON, ALA.—The Houston Power Company, Dothan, has been granted a preliminary permit for a water-power development on the Choctawhatchie River, near Newton.

LITTLE ROCK, ARK.—The electric system of the Light and Water District No. 1, comprising the Park Hill Addition, will be purchased by the city.

MOUNTAIN HOME, ARK.—The local light and power plant has recently been purchased by W. H. McShane, Kansas City, Mo. Extensions and improvements to the system are reported to be under consideration.

CROSSETT, LA.—The Crossett Lumber Company contemplates the construction of a power house in connection with a new lumber mill, to cost about $500,000.

OKLAHOMA CITY, OKLA.—The Hydro-Electric Company has preliminary plans in progress for the construction of a hydro-electric power plant on the Grand River, with extensive transmission system. It will cost in excess of $5,000,000.

TIPTON, OKLA.—The Tipton Power & Light Company contemplates the installation of new equipment, including a new generating set.

TULSA, OKLA.—The National Refining Company contemplates the installation of two new electrically operated plants in connection with the extension of its oil pipe line from Coffeyville, Kan.

WANN, OKLA.—The C. R. Long Electric Company will build a power plant in Wann to furnish light and power service.

CUERO, TEX.—The Cuero Light & Power Company contemplates extensions and improvements to its system, to cost $75,000, including a transmission line to Yorktown and Nordheim.

DE QUINCY, LA.—Bonds to the amount of $120,000 have been voted for the installation of a municipal electric light plant and waterworks system.

MANSFIELD, LA.—The Mansfield Light & Power Company has plans under way for the installation of a 250-kw. generator-set, Corliss engine, etc., at its power plant, for which, it is understood, bids will soon be asked.

DALLAS, TEX.—The City Council has accepted the proposal submitted by the Missouri, Kansas & Texas Railroad Company for the electrification of its railway from Dallas to Denton. The cost is estimated at about $4,000,000 and will include the erection of new power plants, transmission lines, etc.

EL PASO, TEX.—The El Paso Brick Company will build a substation and install motors, controlling equipment, etc., in connection with the proposed electrification of its plant.

FABENS, TEX.—A street-lighting system will be installed on all main thoroughfares in the town.

HOUSTON, TEX.—Plans are being prepared by the Sinclair Pipe Line Company, Houston, for new pipe lines from Mexia to Houston, a distance of 165 miles, to cost about $500,000. The work will include the installation of three new electrically operated pumping plants, with additions to several of the present pumping plants.

ORANGE, TEX.—The Orange Ice, Light & Water Company plans for extensions in its transmission and distributing lines.

VALLEY MILLS, TEX.—Plans have been completed for the installation of a municipal electric light and power plant.

Pacific and Mountain States

SOUTH BEND, WASH.—The Nettleton Power Company, South Bend, has applied for a permit to appropriate the water in the Nasel River in Pacific County to generate electricity. The company proposes to develop 10,000 hp. for distribution in South Bend, Ilwaco, Chinook and other cities. The cost of the project is estimated at $250,000.

SPOKANE, WASH.—New equipment will be installed by the Spokane Valley Irrigation District, including a hydraulic turbine and auxiliary apparatus, two centrifugal pumps, electrical and other power machinery, in connection with a new irrigation project, to cost about $500,000. R. K. Tiffany, Old National Bank Building, is engineer.

BEND, ORE.—The Brooks-Scanlon Lumber Company contemplates extensions to its power house in connection with proposed extensions to its mill, to cost about $250,000. All machinery will be electrically operated.

EUGENE, ORE.—The Eugene Heat & Power Company will make extensions and improvements in its plant.

NEWBERG, ORE.—The electric plants at Willamina, Amity and Sheridan have been acquired by the Yamhill Electric Company, Newberg. Improvements are now being made to the systems, which will be connected up with the transmission system of the Yamhill company. About 13 miles of 11,000-volt transmission line will be erected and 5 miles of the present lines will be rebuilt.

PORTLAND, ORE.—The Peninsula Lumber Company contemplates the construction of a power house in connection with its proposed sawmill on the Willamette River, to cost about $500,000.

LOMPOC, CAL.—Arrangements are being made for the purchase of the local light and power system, to be operated as municipal property at a cost of about $30,000. Extensions and improvements will be made.

LOS ANGELES, CAL.—Bids will be received by the Public Service Commission until Oct. 17 for 20,000-volt cable, as called for in Specification P-289. James P. Vroman is secretary.

LOS ANGELES, CAL.—An ordinance has been approved for the installation of an ornamental lighting system on Sunset Boulevard, between Vista and Stanley Streets.

LOS ANGELES, CAL.—The Pacific Ready-Built Homes, Inc., is planning an addition to its plant, to cost about $150,000. The equipment will include several electrically operated loading cranes.

MARICOPA, CAL.—Bids will be received by the Maricopa Irrigation District until Oct. 27 for the construction of an 11,000-volt transmission line, 51 miles, to be used in connection with a new irrigation district, to include transformer stations, lighting arresters, switches, etc., complete. D. H. Smith is secretary.

MODESTO, CAL.—Plans have been approved by the board of directors of the Modesto Irrigation District for the erection of a transmission line from the Don Pedro dam to the Modesto district. The line will be about 37 miles long. The specifications call for 111 miles of copper-strand wire, 37 miles of iron or steel wire, stranded; 670 red-cedar poles, 80 galvanized-iron or steel cross-arms and 2,400 insulators.

MONROVIA, CAL.—Plans are being considered for the installation of an ornamental lighting system on White Oak Avenue and on Orange Street, about 2½ miles.

TURLOCK, CAL.—Plans are under consideration for a municipal electric distributing system. Power will be purchased from the Turlock Irrigation District plant.

TUCSON, ARIZ.—Electrical District No. 1, Casa Grande, Ariz., is arranging a bond issue of $200,000 for the installation of transmission and distributing lines, with substations, etc., for irrigation work in the Gila River Valley.

BASIN, WYO.—A municipal electric light and power plant will be constructed at once. Prince & Nixon, Peters Trust Building, Omaha, Neb., are engineers.

Canada

POINT GREY, B. C.—A bylaw to establish a municipal street-lighting system, to cost about $135,000, will be submitted to the ratepayers.

HARTVILLE, N. S.—The Premier Paper & Power Company is planning to develop an additional 5,000 hp. to supply power for its local plant.

KENORA, ONT.—Bylaws have been passed by the Town Council for raising $7,433 for extensions to the telephone system and $4,610 for extensions to the electric lighting system.

PORT DALHOUSIE, ONT.—The Council has passed a bylaw providing $5,000 for extensions and improvements to the hydro-electric system.

Electrical Patents

Announced by U. S. Patent Office

(Issued Sept. 19, 1922)

1,429,909. METHOD OF PREPARING FURNACE LININGS; M. Unger, Pittsfield, Mass. App. filed Oct. 13, 1920. Green furnace lining in desired shape baked out by heater consisting of metal rings of different melting points.

1,429,914. OIL-SEAL INSULATOR; G. R. Lewers, Brooklyn, N. Y. App. filed Nov. 8, 1918. Electric precipitator of closed-chamber type safely insulated from high-tension conductor.

(Issued Sept. 26, 1922)

1,429,931. SIGNALING CIRCUITS FOR TOLL LINES; J. Davidson, Jr., Montclair, N. J. App. filed Dec. 12, 1918. Two-way toll line so designed that connections may be established in either direction.

1,429,948. ELECTRICAL APPARATUS; G. E. Hulse, Newark, N. J. App. filed Feb. 16, 1917. Storage-battery-charging relay.

1,429,972. DESK OPERATOR'S CIRCUITS; W. A. Rhodes, New York, N. Y. App. filed Dec. 5, 1918. Equipped with a single-ended cord for either talking or monitoring.

1,430,007. COMPRESSIBLE RHEOSTAT; A. W. Donop, Niagara Falls, N. Y. App. filed April 17, 1914. Pressure on carbon-resistance pile varied by solenoid.

1,430,042. HAULING CABLE; W. von Raczynski, Bismarckshohe, Germany. App. filed Aug. 1, 1918. Traction system for agricultural machines.

1,430,082. TELEPHONE REPRODUCER; F. Holmstrom, Jr., Chicago, Ill. App. filed Nov. 3, 1917. Relieves magnet pull during time magnet is not responding to voice currents.

1,430,095. THERAPEUTIC APPARATUS; W. Meyer, Chicago, Ill. App. filed Dec. 18, 1918. Table for taking X-ray photographs and for administering electric treatment.

1,430,096. X-RAY APPARATUS; W. Meyer, Chicago, Ill. App. filed Nov. 17, 1920. Milliammeter connected through commutating device operating synchronously with rectifier in secondary winding.

1,430,104. AUTOMATIC CONTROL OF ELECTRICAL FURNACES; T. E. Niblock, Great Falls, Mont. App. filed Feb. 8, 1921. Automatic control of furnace electrodes.

1,430,106. MEANS FOR CHARGING STORAGE BATTERIES; C. E. Ogden, Cincinnati, Ohio. App. filed Feb. 18, 1920. Batteries in series automatically disconnected from circuit when fully charged and resistance inserted for each.

1,430,107. MEANS FOR CHARGING STORAGE BATTERIES; C. E. Ogden, Cincinnati, Ohio. App. filed July 26, 1920. Regulating rate at which battery is charged.

1,430,110. RAIL BOND; C. A. Parker, Haugan, Mont. App. filed May 8, 1921. Incased by joint plates of rails.

1,430,118. PROCESS AND APPARATUS FOR SEALING LAMPS; R. Le Rossignol, Harrow, England. App. filed July 8, 1920. Apparatus for exhausting electrical glow lamps and glass receptacles.

1,430,130. ARMATURE WINDING; W. J. Warder, Jr., Chicago, Ill. App. filed Jan. 17, 1918. Heavy-current generators used to supply current for electrolytic work.

1,430,167. METHOD OF TREATING AND RESTORING USED STORAGE BATTERIES; M. E. Hunt, Belle Plains, Iowa. App. filed Nov. 4, 1921. By heating plates sufficiently to dry them.

1,430,188. TROLLEY SHOE; H. A. Rhoads, Leetonia, Ohio. App. filed April 1, 1922. Elliptical sliding shoe with four wearing surfaces.

1,430,245. CENTRAL CIRCULATING DEHYDRATOR FOR PETROLEUM OILS; W. Meredith, Alameda, Cal. App. filed March 14, 1921. Oils subjected to action of electric field, causing water particles to agglomerate and form large masses.

1,430,246. STRATIFYING DEHYDRATOR; W. Meredith, Alameda, Cal. App. filed April 30, 1921. Treats oils of widely different characteristics.

1,430,256. METHOD OF AND APPARATUS FOR TELEPHONICALLY TRANSMITTING SPEECH; E. S. Pridham and P. L. Jensen, San Francisco, Cal. App. filed Aug. 21, 1917. Transmitter for aëroplane communication.

1,430,257. TELEPHONE TRANSMITTER; E. S. Pridham, Oakland, Cal. App. filed May 7, 1918. Diaphragm and button so arranged that extraneous noises are reduced.

1,430,258. TELEPHONE TRANSMITTER; E. S. Pridham, Oakland, Cal. App. filed Dec. 26, 1918. Effective whether diaphragm is in a vertical or a horizontal plane.

1,430,294. DEHYDRATOR; H. C. Eddy, Los Angeles, and J. T. Worthington, Whittier, Cal. App. filed March 2, 1921. Water particles agglomerated by electric current.

1,430,295. ADJUSTABLE FIELD DEHYDRATOR; H. C. Eddy, Los Angeles, Cal. App. filed June 25, 1921. Prevents the persistence of water chains.

1,430,296. DOUBLE-FIELD DEHYDRATOR; H. C. Eddy, Los Angeles, Cal. App. filed June 25, 1920. No moving parts and has large capacity.

1,430,300. DEHYDRATOR; F. W. Harris, Los Angeles, Cal. App. filed Sept. 7, 1920. Liquids of different conductivity and specific gravity readily separated.

1,430,301. STARTER FOR ELECTRICAL DEHYDRATORS; F. W. Harris, Los Angeles, Cal. App. filed Nov. 1, 1920. May be started on very wet emulsions.

1,430,302. METHOD OF AUTOMATIC DEHYDRATION; F. W. Harris, Los Angeles, Cal. App. filed May 31, 1921. Prevents the accumulation of free water masses between electrodes.

1,430,352. AUTOMOBILE SIGNAL DEVICE; A. Berger, Bayside, N. Y. App. filed May 1, 1922. Directional control device.

1,430,364. ANNUNCIATOR; C. P. Evans, St. Louis, M. L. Greenstreet and W. Day, Maplewood, Mo. App. filed Nov. 15, 1921. Signal sounded or flashed at predetermined periods.